THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

SK NEXILIS CO., LTD.	§	
	§	
v.	§	CASE NO. 2:23-CV-539-JRG-RSP
	§	
SOLUS ADVANCED MATERIALS CO., LTD., et al.	§	
	§	

CLAIM CONSTRUCTION ORDER

On May 14, 2025, the Court held a hearing to determine the proper construction of disputed terms in United States Patent Nos. 9,457,541, 10,480,090, 10,811,689, 11,346,014, and 11,591,706. Before the Court is the Opening Claim Construction Brief (Dkt. No. 89) filed by Plaintiff SK nexilis ("SKN"). Also before the Court are the Responsive Claim Construction Brief (Dkt. No. 92) filed by Defendants Solus Advanced Materials Co., Ltd., Volta Energy Solutions Canada Inc., Volta Energy Solutions Europe KFT, Volta Energy Solutions Hungary KFT, Volta Energy Solutions S.A.R.L. (collectively,"Volta"), Plaintiff's reply (Dkt. No. 95), the parties' March 7, 2025 Joint Claim Construction and Prehearing Statement (Dkt. No. 74), and the parties' April 30, 2025 P.R. 4-5(d) Joint Claim Construction Chart (Dkt. No. 97).

Having reviewed the arguments made by the parties at the hearing and in their claim construction briefing, having considered the intrinsic evidence, and having made subsidiary factual findings about the extrinsic evidence, the Court hereby issues this Claim Construction Order. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005) (*en banc*); *Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 841 (2015).

Table of Contents

I. BACKGROUND

Plaintiff alleges infringement of United States Patents No. 9,457,541 ("the '541 Patent"), 10,480,090 ("the '090 Patent), 10,811,689 ("the '689 Patent"), 11,346,014 ("the '014 Patent"), and 11,591,706 ("the '706 Patent"). Dkt. No. 89, Exs. 1–5. Plaintiff submits that "[t]he five Asserted Patents are directed to improved physical material properties of an electrolytic copper foil of a lithium secondary battery." Dkt. No. 89 at 1.

The '541 Patent, titled "Copper Foil for Current Collector of Lithium Secondary Battery with Improved Wrinkle Characteristics," issued on October 4, 2016, and bears an earliest priority date of July 15, 2010. The Abstract of the '541 Patent states:

> A copper foil for a current collector of a lithium secondary battery has a crystalline structure, in which a ratio of the sum of texture coefficients of a (111) surface and a (200) surface to the total sum of texture coefficients of the (111), (200) and (220)

> surfaces is 60 to 85%, a ratio of the texture coefficient of the (111) surface to the total sum of texture coefficients of the (111), (200) and (220) is 18 to 38%, a ratio of the texture coefficient of the (200) surface thereto is 28 to 62%, and a ratio of the texture coefficient of the (220) surface thereto is 15 to 40%. The copper foil has surface roughness (R_z-JIS) of 2 μm or less, weight deviation of 3% or less, tensile strength of 30 to 40 kgf/mm^2, elongation of 3 to 20%, and thickness of 1 to 35 μm.

The '090 Patent, titled "Electrolytic Copper Foil, Current Collector Comprising the Same, Electrode Comprising the Same, Secondary Battery Comprising the Same, and Method for Manufacturing the Same," issued on November 19, 2019, and bears an earliest priority date of June 24, 2015. The Abstract of the '090 Patent states:

> An electrolytic copper foil, a current collector including the same, an electrode including the same, a secondary battery including the same and a method for manufacturing the same which can secure secondary batteries with high capacity maintenance. The electrolytic copper foil includes a first surface and a second surface opposite to the first surface, wherein each of the first and second surfaces has a peak count roughness R_{pc} of 10 to 100.

The '689 Patent, titled "Easily Handleable Electrolytic Copper Foil, Electrode Comprising the Same, Secondary Battery Comprising the Same, and Method for Manufacturing the Same," issued on October 20, 2020, and bears an earliest priority date of October 12, 2016. The Abstract of the '689 Patent states:

> An easily handleable electrolytic copper foil securing a highly durable secondary battery, an electrode including same, a secondary battery including same, and a method of manufacturing same. The electrolytic copper foil including first and second surfaces includes a copper layer including a matte surface facing the first surface and a shiny surface facing the second surface, a first protective layer formed on the matte surface of the copper layer, and a second protective layer formed on the shiny surface of the copper layer. A coefficient of thermal expansion of the electrolyte copper foil measured using thermomechanical analyzer while heating the electrolytic copper foil from 30 to 190° C. at 5° C./min ranges from 16 to 22 μm/(m·° C.), tensile strength of the electrolytic copper foil measured after heat treatment at 190° C. , ranges from 21 to 36 kgf / mm², and weight deviation of the electrolytic copper foil is 5 % or less.

The '014 Patent, titled "Electrolytic Copper Foil, Method for Producing Same, and High-Capacity Li Secondary Battery Negative Electrode Including Same," issued on May 31, 2022, and bears an earliest priority date of September 1, 2017. The Abstract of the '014 Patent states:

> The present invention relates to an electrolytic copper foil current collector where the surface properties are controlled to achieve a high adhesiveness to a negative electrode material. An electrolytic copper foil has a first surface and the second surface, the electrolytic copper foil comprising a first protective layer on the first surface side, a second protective layer on the second surface side, and a copper film between the first and second protective layers, wherein the coupling coefficient at the first surface or second surface of the electrolytic copper foil is 1.5 to 9.4 as represented by coupling coefficient=Rp/μm+ peak density/30+ amount of Cr adhesion/(mg/m^2) (here, peak density is measured according to ASME standard B46.1). The electrolytic copper foil has a high adhesiveness to a negative electrode material and a low electrical resistance can be provided by controlling the surface properties of the electrolytic copper foil surface.

The '706 Patent, for example, is titled "Electrolytic Copper Foil Having Excellent Handling Characteristics in Postprocessing, and Manufacturing Method Therefor," issued on February 28, 2023, and bears an earliest priority date of January 31, 2018. The Abstract of the '706 Patent states:

> The present invention relates to an electrolytic copper foil having excellent handling characteristics in the manufacture of copper foil and in post-processing for manufacturing a secondary battery. The present invention provides an electrolytic copper foil having a first surface and a second surface, wherein the texture coefficient of the (220) plane of the electrolytic copper foil is 0.4–1.32, the difference (|Δ(Rz/Ra)|) between Rz/Ra on the first surface and Rz/Ra on the second surface, of the electrolytic copper foil, is less than 2.42, and the difference (|ΔPD|) in peak density (PD) between the first surface and the second surface, of the electrolytic copper foil, is 96 ea or less.

Plaintiff submits that "[w]hile each of the Asserted Patents is directed to improvements to copper foil for a current collector of a secondary battery, none of the Asserted Patents are from the same patent family." Dkt. No. 89 at 2.

Shortly before the start of the May 14, 2025 hearing, as to most of the disputed terms the Court provided the parties with preliminary constructions with the aim of focusing the parties'

arguments and facilitating discussion. Those preliminary constructions are noted below within the discussion for each term.

II. LEGAL PRINCIPLES

"It is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude.'" *Phillips*, 415 F.3d at 1312 (quoting *Innova/Pure Water Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). Claim construction is clearly an issue of law for the court to decide. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 970–71 (Fed. Cir. 1995) (en banc), *aff'd*, 517 U.S. 370 (1996). "In some cases, however, the district court will need to look beyond the patent's intrinsic evidence and to consult extrinsic evidence in order to understand, for example, the background science or the meaning of a term in the relevant art during the relevant time period." *Teva*, 135 S. Ct. at 841 (citation omitted). "In cases where those subsidiary facts are in dispute, courts will need to make subsidiary factual findings about that extrinsic evidence. These are the 'evidentiary underpinnings' of claim construction that we discussed in *Markman*, and this subsidiary factfinding must be reviewed for clear error on appeal." *Id.* (citing 517 U.S. 370).

To determine the meaning of the claims, courts start by considering the intrinsic evidence. *See Phillips*, 415 F.3d at 1313; *see also C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 861 (Fed. Cir. 2004); *Bell Atl. Network Servs., Inc. v. Covad Commc'ns Group, Inc.*, 262 F.3d 1258, 1267 (Fed. Cir. 2001). The intrinsic evidence includes the claims themselves, the specification, and the prosecution history. *See Phillips*, 415 F.3d at 1314; *C.R. Bard*, 388 F.3d at 861. Courts give claim terms their ordinary and accustomed meaning as understood by one of ordinary skill in the art at the time of the invention in the context of the entire patent. *Phillips*, 415 F.3d at 1312–13; *accord Alloc, Inc. v. Int'l Trade Comm'n*, 342 F.3d 1361, 1368 (Fed. Cir. 2003).

The claims themselves provide substantial guidance in determining the meaning of particular claim terms. *Phillips*, 415 F.3d at 1314. First, a term's context in the asserted claim can be very instructive. *Id.* Other asserted or unasserted claims can aid in determining the claim's meaning because claim terms are typically used consistently throughout the patent. *Id.* Differences among the claim terms can also assist in understanding a term's meaning. *Id.* For example, when a dependent claim adds a limitation to an independent claim, it is presumed that the independent claim does not include the limitation. *Id.* at 1314–15.

"[C]laims 'must be read in view of the specification, of which they are a part.'" *Id.* at 1315 (quoting *Markman*, 52 F.3d at 979). "[T]he specification 'is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.'" *Phillips*, 415 F.3d at 1315 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)); *accord Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1325 (Fed. Cir. 2002). This is true because a patentee may define his own terms, give a claim term a different meaning than the term would otherwise possess, or disclaim or disavow the claim scope. *Phillips*, 415 F.3d at 1316. In these situations, the inventor's lexicography governs. *Id.* The specification may also resolve the meaning of ambiguous claim terms "where the ordinary and accustomed meaning of the words used in the claims lack sufficient clarity to permit the scope of the claim to be ascertained from the words alone." *Teleflex*, 299 F.3d at 1325. But, "[a]lthough the specification may aid the court in interpreting the meaning of disputed claim language, particular embodiments and examples appearing in the specification will not generally be read into the claims." *Comark Commc'ns, Inc. v. Harris Corp.*, 156 F.3d 1182, 1187 (Fed. Cir. 1998) (quoting *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1571 (Fed. Cir. 1988)); *accord Phillips*, 415 F.3d at 1323.

The prosecution history is another tool to supply the proper context for claim construction because a patent applicant may also define a term in prosecuting the patent. *Home Diagnostics, Inc. v. Lifescan, Inc.*, 381 F.3d 1352, 1356 (Fed. Cir. 2004) ("As in the case of the specification, a patent applicant may define a term in prosecuting a patent."). "[T]he prosecution history (or file wrapper) limits the interpretation of claims so as to exclude any interpretation that may have been disclaimed or disavowed during prosecution in order to obtain claim allowance." *Standard Oil Co. v. Am. Cyanamid Co.*, 774 F.2d 448, 452 (Fed. Cir. 1985).

Although extrinsic evidence can be useful, it is "less significant than the intrinsic record in determining the legally operative meaning of claim language." *Phillips*, 415 F.3d at 1317 (citations and internal quotation marks omitted). Technical dictionaries and treatises may help a court understand the underlying technology and the manner in which one skilled in the art might use claim terms, but technical dictionaries and treatises may provide definitions that are too broad or may not be indicative of how the term is used in the patent. *Id.* at 1318. Similarly, expert testimony may aid a court in understanding the underlying technology and determining the particular meaning of a term in the pertinent field, but an expert's conclusory, unsupported assertions as to a term's definition are entirely unhelpful to a court. *Id.* Generally, extrinsic evidence is "less reliable than the patent and its prosecution history in determining how to read claim terms." *Id.*

The Supreme Court of the United States has "read [35 U.S.C.] § 112, ¶ 2 to require that a patent's claims, viewed in light of the specification and prosecution history, inform those skilled in the art about the scope of the invention with reasonable certainty." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2129 (2014). "A determination of claim indefiniteness is a legal conclusion that is drawn from the court's performance of its duty as the construer of patent

claims." *Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1347 (Fed. Cir. 2005) (citations and internal quotation marks omitted), *abrogated on other grounds by Nautilus,* 134 S. Ct. 2120. "Indefiniteness must be proven by clear and convincing evidence." *Sonix Tech. Co. v. Publ'ns Int'l, Ltd.*, 844 F.3d 1370, 1377 (Fed. Cir. 2017).

III. AGREED TERMS

In their March 7, 2025 P.R. 4-3 Joint Claim Construction and Prehearing Statement, the parties submitted that "[t]he parties have not agreed to the constructions of any claim terms." Dkt. No. 74 at 1.

IV. DISPUTED TERMS

In their claim construction briefing, the parties have organized the disputed terms differently. Rather than attempt to divine an ideal ordering, the Court largely adopts the ordering and organization set forth in Plaintiff's opening brief. Because the organization is somewhat different, and because Plaintiff's opening brief uses numbering, the Court uses lettering rather than numbering so as to minimize potential confusion. Also, the Court notes Term Number designations that the parties have used.

A. Tensile Strength Terms (Terms No. 3, 10, 14)

"a tensile strength of 30 to 40 kgf/mm^2" ('541 Patent, Claim 1)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Not indefinite	Indefinite
"a tensile strength of 30 to 60 kgf/mm^2" ('090 Patent, Claim 4)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Not indefinite	Indefinite

"a tensile strength of the electrolytic copper foil, which is measured after a heat treatment at a temperature of 190° C for 1 hour, ranges from 21 to 36 kgf/mm²" ('689 Patent, Claim 1)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Not indefinite	Indefinite

Dkt. No. 89 at 5–6; Dkt. No. 97, Ex. A at 4–5, 11 & 15.

Shortly before the start of the May 14, 2025 hearing, the Court provided the parties with the following preliminary construction for these disputed terms: "Plain meaning [not indefinite]."

(1) The Parties' Positions

Plaintiff argues that Defendants' indefiniteness arguments should be rejected because "the claim language informs a POSITA whether heat treatment is required and the temperature for testing," and "[h]eat treatment is only performed when the asserted claim expressly states so." Dkt. No. 89 at 6–7. Plaintiff also argues that "because none of the asserted claims require a particular temperature at which to measure tensile strength, a POSITA would have understood that the measurement should take place at room temperature." *Id.* at 7. Plaintiff notes that whereas neither the '541 Patent nor the '090 Patent specifies any heat treatment or measurement temperature, "the specification of the '689 Patent consistently details the heat treatment parameters (e.g., the rate at which copper foil is heated) whenever 'tensile strength' is referenced," and "[a] POSITA would therefore know to apply the heat treatment as specified, allow the sample to cool to room temperature, and then measure its tensile strength using the UTM [(Universal Testing Machine)]." *Id.* at 7–8 (citations omitted). Plaintiff emphasizes that "neither party disputes that 'tensile strength' is a well-known concept readily measured by a standard equipment." *Id.* at 8 (citation omitted).

Defendants respond that these terms are indefinite because "the '541, '090 and '689 patents do not inform a POSITA as to the temperature at which to perform the tensile strength test despite describing an application of copper foils (i.e., batteries) where both room-temperature and high-temperature tensile strength is important." Dkt. No. 89 at 2; *see id.* at 2–3. Defendants argue, for example, that Plaintiff's reliance on the disclosure in the '689 Patent regarding heat treatment "confuses the manufacturing operation of heat treating a foil to affect its final properties with the test parameter used when measuring tensile strength regardless of whether the sample has undergone heat treatment during its manufacturing." *Id.* at 5 (citations omitted). Further, Defendants note that "claim 4 of the '706 patent recites a 'tensile strength measured at room temperature, of 30 to 65 kgf/mm^2,'" and Defendants argue that "[i]f 'tensile strength' by default were understood to refer to room temperature, the reference to room temperature testing would be superfluous." *Id.*

Plaintiff replies that "there is only *one method*—using a universal testing machine ('UTM')—and the asserted patents plainly state as such," and "[t]o the extent Defendants argue that certain test conditions—measurement temperature or heat treatment—must be specified, that argument has already been rejected by the Federal Circuit because such test conditions are well within a POSITA's knowledge." Dkt. No. 95 at 1; *see id.* at 1–2 (citing, e.g., *Wellman, Inc. v. Eastman Chemical Co.*, 642 F.3d 1355, 1367–68 (Fed. Cir. 2011)).

At the May 14, 2025 hearing, the parties presented oral arguments.

(2) Analysis

As a threshold matter, the *Inter Partes* Review ("IPR") proceedings cited by Plaintiff do not significantly affect the Court's claim construction analysis.

Claim 1 of the '541 Patent, for example, recites (emphasis added):

1. A copper foil for a current collector of a lithium secondary battery,

wherein, in a crystalline structure, a ratio of a sum of texture coefficients of a (111) surface and a (200) surface to a total sum of texture coefficients of the (111) surface, the (200) surface and a (220) surface is 60 to 85%, a ratio of a texture coefficient of the (111) surface to the total sum of texture coefficients of the (111) surface, the (200) surface and the (220) surface is 18 to 38%, a ratio of the texture coefficient of the (200) surface to the total sum of texture coefficients of the (111) surface, the (200) surface and the (220) surface is 28 to 62%, and a ratio of the texture coefficient of the (220) surface to the total sum of texture coefficients of the (111) surface, the (200) surface and the (220) surface is 15 to 40%,

wherein the texture coefficient satisfies the following equation:

$$\boldsymbol{TC(hkl)} \geq \frac{\dfrac{\boldsymbol{I(hkl)}}{\boldsymbol{I_0(hkl)}}}{\dfrac{\mathbf{1}}{\boldsymbol{n}}\sum\dfrac{\boldsymbol{I(hkl)}}{\boldsymbol{I_0(hkl)}}}$$

wherein I(hkl) represents a measured diffraction intensity with respect to a (hkl) surface, and I_0(hkl) represents a standard diffraction intensity of ASTM (American Society of Testing Materials) standard powder-shaped diffraction data,

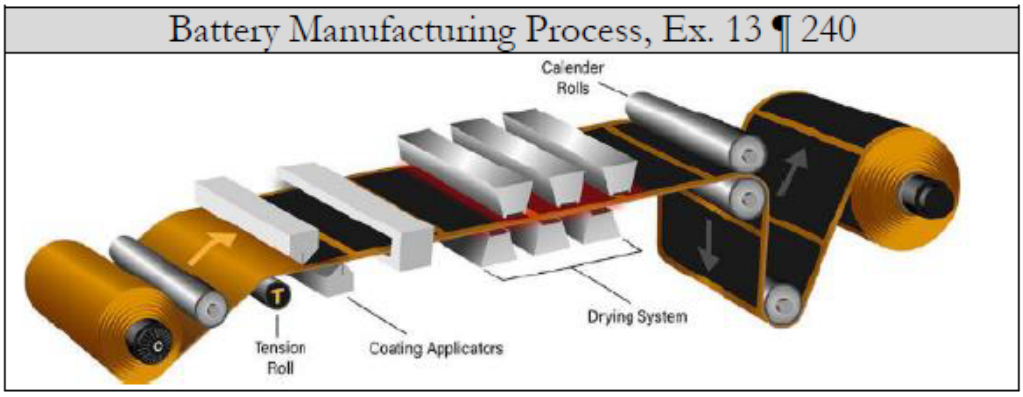
wherein the copper foil has a weight deviation of 3% or less, and

wherein the copper foil has *a tensile strength of 30 to 40 kgf/mm*^{2},

so as to prevent the generation of wrinkles at a surface of the copper foil.

The parties agree that "tensile strength" is a well-known term of art. *See* Dkt. No. 92, Ex. 32, Arnold dep. at 188:21–190:31 ("Tensile strength is a standard term of the art."). Also, by way of background, Defendants' expert states:

> During manufacture of a battery, copper foils are subjected to ordinary and high-temperatures and stresses associated with rolling, winding and calendaring processes. For example, . . . a copper foil coated with active material may be tensioned to assist with the even application of active material (black) and calendared, meaning that it is subjected to high pressures and temperatures to help adhere the active material.



> After manufacture, the copper foil is used at temperatures closer to ordinary temperatures and should have a sufficient tensile strength to withstand the repeated expansion and contraction of a battery during use without breaking and potentially generating a short circuit.

Dkt. No. 89, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶ 240 (citations omitted).

The specification discloses test results in which "the tensile strength was measured by using a UTM (Universal Testing Machine)." '541 Patent at 4:50–51; *see* '689 Patent at 11:66–12:2 (similar). Defendants do not dispute that a Universal Testing Machine would be the appropriate tool for measuring tensile strength. *See* Dkt. No. 92, Ex. 32, Apr. 1, 2025 Arnold dep. at 184:24–185:13.

As for heat treatment, the disputed term in Claim 1 of the '689 Patent expressly recites a heat treatment, namely that the tensile strength is measured "after a heat treatment at a temperature of 190º C for 1 hour." *See also* '689 Patent at 6:1–4 & 11:66–12:2.

The express recital of a heat treatment in Claim 1 of the '689 Patent weighs against requiring any particular heat treatment in Claim 1 of the '541 Patent and Claim 4 of the '090 Patent. The absence of any recited heat treatment perhaps means that Claim 1 of the '541 Patent and Claim 4 of the '090 Patent are broader than Claim 1 of the '689 Patent in this regard, but "[b]readth is not indefiniteness." *BASF Corp. v. Johnson Matthey Inc.*, 875 F.3d 1360, 1367 (Fed. Cir. 2017).

As for temperature, Plaintiff does not dispute that tensile strength varies based on temperature. Nonetheless, the *Dow Chemical* and *Honeywell* cases cited by Defendants are unpersuasive. *Dow Chem. Co. v. Nova Chems. Corp. (Canada)*, 803 F.3d 620 (Fed. Cir. 2015); *Honeywell Int'l, Inc. v. U.S. Int'l Trade Comm'n*, 341 F.3d 1332 (Fed. Cir. 2003). *Dow Chemical* found indefiniteness where: the disputed term involved a slope; there were four methods of calculating the slope; "[t]here is no question that each of these four methods may produce different

results, i.e., a different slope"; and "[n]either the patent claims nor the specification here discusses the four methods or provides any guidance as to which method should be used or even whether the possible universe of methods is limited to these four methods." 803 F.3d at 633–34. In *Honeywell*, the Federal Circuit affirmed an International Trade Commission indefiniteness finding where skilled artisans knew of three different techniques for preparing samples to measure the claimed feature; a fourth, confidential technique was disclosed only in the patentee's proprietary documents; and only the confidential technique provided measurements of the claimed feature that fell within the claimed ranges. 341 F.3d at 1336.

In the present case, Defendants' expert acknowledges that "[t]ensile strength is a standard term of the art" and "has certainly been around for a long time." Dkt. No. 92, Ex. 32, Apr. 1, 2025 Arnold dep. at 188:21–190:13. Plaintiff's expert opines that "[n]o temperature or heat treatment parameters needed to be specified here because a POSITA would have known to measure a sample at room temperature (i.e., around 20º C), without further treatment." Dkt. No. 89, Ex. 8, Mar. 7, 2025 Steingart Decl. ¶ 38; *see id.* at ¶ 39. This opinion is persuasive because, for example, if any temperature could be used then the temperature could even be above the melting point of the material, at which point the material would be liquid and presumably would have no measurable tensile strength at all. Plaintiff's expert's interpretation is more natural in the context of these claims. This is also consistent with Defendants' expert referring to "*ordinary* and high-temperatures" when providing background information regarding copper foil manufacturing. *Id.*, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶ 240 (emphasis added). Similar use of the word "ordinary" also appears in cited art. *See, e.g., id.* ¶ 245 ("[o]rdinary temperature tensile strength") (citation omitted).

Defendants also submit evidence of testing standards that describe an "Ambient Temperature Testing" method (not specifying a temperature) and an "Elevated Temperature Testing" method (specifying 180°C) for testing the tensile strength of copper foil. Dkt. No. 92, Ex. 18, IPC-TM-650 (PRIOR_ART00000820–21). Defendants' expert notes certain references cited during prosecution that set forth specific temperatures. Dkt. No. 89, Ex. 7, Arnold Decl. ¶ 243.

Nonetheless, in the absence of any claim limitation regarding an elevated temperature (or any such definition in the specification), the opinion of Plaintiff's expert is persuasive that a person of ordinary skill in the art would use ambient temperature. Dkt. No. 89, Ex. 8, Mar. 7, 2025 Steingart Decl. ¶¶ 38–39.

Defendants note that Claim 4 of the '706 Patent recites a "tensile strength measured at room temperature, of 30 to 65 kgf/mm^2." In some cases, "the presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim." *Phillips*, 415 F.3d at 1315. Here, this dependent claim recites more than just a room temperature limitation, reciting also a specific tensile strength ("30 to 65 kgf/mm^2"). Any inference of claim differentiation is therefore of limited weight, if any. Such an inference appears inappropriate to support Defendants' assertion of indefiniteness, particularly when considering that the '706 Patent is not one of the patents in which the disputed terms at issue appear. Also, Plaintiff persuasively argued at the May 14, 2025 hearing that the indefiniteness inquiry considers whether a challenged claim is reasonably clear, not whether other claims provide greater specificity.

Further, Defendants' citation of delivery specifications setting forth testing at "RT °C" (with "RT" presumably referring to "Room Temperature") does not justify finding that the absence

of a specified temperature gives rise to indefiniteness, especially in light of the presumption of validity. *See* Dkt. No. 92, Ex. 54 at 4 & 8 (VOLTA_00014810, -814); *see also id.*, Ex. 55 at 4–5 (VOLTA_00012968–69); *Sonix*, 844 F.3d at 1377 ("Indefiniteness must be proven by clear and convincing evidence.").

Finally, Defendants' expert testified as to understanding what "ambient temperature" means in this context of measuring tensile strength. *See* Dkt. No. 92, Ex. 32, Apr. 1, 2025 Arnold dep. at 202:17–18 ("if I was told measure it at ambient temperature I would know what temperature to use"). This temperature need not be specified by the patents. *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 959 F.3d 1091, 1102 (Fed. Cir. 2020) ("a 'patent need not teach, and preferably omits, what is well known in the art'") (quoting *Spectra-Physics, Inc. v. Coherent, Inc.*, 827 F.2d 1524, 1534 (Fed. Cir. 1987)).

In sum, Defendants do *not* persuasively demonstrate that there are multiple measurement methods that produce different results without any understanding as to which method to use, and *Dow Chemical* and *Honeywell* are therefore unpersuasive. *See Dow Chem.*, 803 F.3d 620; *see also Honeywell*, 341 F.3d 1332; *Ball Metal Beverage Container Corp. v. Crown Packaging Tech., Inc.*, No. 2020-1212, 838 F. App'x 538, 542 (Fed. Cir. Dec. 31, 2020) ("Under court case law, then, a claim may be invalid as indefinite when (1) different known methods exist for calculating a claimed parameter, (2) nothing in the record suggests using one method in particular, and (3) application of the different methods result in materially different outcomes for the claim's scope such that a product or method may infringe the claim under one method but not infringe when employing another method."). And, as the Federal Circuit has noted: "To be sure, even where the claims require a particular test result, there may be (and often are) disputes between the parties as to the proper application of the test methodology in the circumstances of an individual

case. But those disputes are disputes about whether there is infringement, not disputes about whether the patent claims are indefinite." *Presidio Components, Inc. v. Am. Tech. Ceramics Corp.*, 875 F.3d 1369, 1377 (Fed. Cir. 2017); *accord Ironburg Inventions Ltd. v. Valve Corp.*, 64 F.4th 1274, 1289–90 (Fed. Cir. 2023) (discussing *Presidio*).

The Court therefore hereby expressly rejects Defendants' indefiniteness argument. Defendants present no alternative proposed constructions, and no further construction is necessary.

The Court accordingly hereby construes "a tensile strength of 30 to 40 kgf/mm^2," "a tensile strength of 30 to 60 kgf/mm^2," and "a tensile strength of the electrolytic copper foil, which is measured after a heat treatment at a temperature of 190º C for 1 hour, ranges from 21 to 36 kgf/mm^2" to have their **plain meaning**.

B. Texture Coefficient Terms (Terms No. 2, 20, 30)

"in a crystalline structure, a ratio of a sum of texture coefficients of a (111) surface and a (200) surface to a total sum of texture coefficients of the (111) surface, the (200) surface and a (220) surface is 60 to 85%, a ratio of a texture coefficient of the (111) surface to the total sum of texture coefficients of the (111) surface, the (200) surface and the (220) surface is 18 to 38%, a ratio of the texture coefficient of the (200) surface to the total sum of texture coefficients of the (111) surface, the (200) surface and the (220) surface is 28 to 62%, and a ratio of the texture coefficient of the (220) surface to the total sum of texture coefficients of the (111) surface, the (200) surface and the (220) surface is 15 to 40%, wherein the texture coefficient satisfies the following equation:

$$TC(hkl) \geq \frac{\frac{I(hkl)}{I_0(hkl)}}{\frac{1}{n}\sum\frac{I(hkl)}{I_0(hkl)}}$$

wherein I(hkl) represents a measured diffraction intensity with respect to a (hkl) surface, and I_0(hkl) represents a standard diffraction intensity of ASTM (American Society of Testing Materials) standard powder-shaped diffraction data"

('541 Patent, Claim 1)

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Not indefinite	Indefinite

<table>
<tr><td colspan="2">“a texture coefficient of (220) plane of the electrolytic copper foil defined by Equation 1 below is 0.4 to 1.32,
$$TC(220) \geq \frac{\frac{I(220)}{I_0(220)}}{\frac{1}{n}\sum\frac{I(hkl)}{I_0(hkl)}}$$
(Equation 1)”
(’706 Patent, Claim 1)</td></tr>
<tr><td>Plaintiff’s Proposed Construction</td><td>Defendants’ Proposed Construction</td></tr>
<tr><td>Not indefinite</td><td>Indefinite</td></tr>
<tr><td colspan="2">“an X-ray diffraction pattern of the copper film measured at the first surface or the second surface shows a texture coefficient of a (220) plane, defined by Mathematical Expression 2 below, of 0.49 to 1.28, 0.49 to 1.28,
$$TC(hkl) \geq \frac{\frac{I(hkl)}{I_0(hkl)}}{\frac{1}{n}\sum\frac{I(hkl)}{I_0(hkl)}}$$
(Mathematical Expression 2)
wherein TC(220) is the texture coefficient of the (220) plane, wherein I(hkl) is XRD diffraction strength of (hkl) crystal plane of the electrolytic copper foil, I_0(hkl) is XRD diffraction strength of (hkl) crystal plane of standard copper powder prescribed by Joint Committee on Powder Diffraction Standards (JCPDS), wherein n is a number of diffraction peaks within 30° to 95° of diffraction angles (2θ), and wherein the (hkl) crystal plane includes (111), (200), (220), and (311) crystal planes”
(’014 Patent, Claim 2)</td></tr>
<tr><td>Plaintiff’s Proposed Construction</td><td>Defendants’ Proposed Construction</td></tr>
<tr><td>Not indefinite</td><td>Indefinite</td></tr>
</table>

Dkt. No. 89 at 9–11; Dkt. No. 97, Ex. A at 2–3, 21 & 31–32.

Shortly before the start of the May 14, 2025 hearing, the Court provided the parties with the following preliminary construction for these terms: “Plain meaning [not indefinite].”

(1) The Parties’ Positions

Plaintiff argues that “[t]here is no dispute that ‘texture coefficient’ or ‘TC’ is a well-understood and fundamental property of copper foils, and is expressly defined by the mathematical

expression found in the asserted claims of the '706 and '014 Patents." Dkt. No. 89 at 11 (citations omitted). Plaintiff also argues that whereas "Defendants argue that a litany of testing parameters, settings, configurations, and post-experiment data-processing techniques could have influenced the calculation of TC," "these so-called 'Experimental and Analytical Choices' are well within the knowledge and skills of a POSITA to select when operating the diffractometer to calculate the TC for a given sample," and Plaintiff argues that, regardless, such choices do not "result in materially different outcomes for TC values." *Id.* at 11–12; *see id.* at 12–16.

Defendants respond that these terms "are indefinite because there are a number of choices that a POSITA would need to make to evaluate infringement, the patents provide no guidance, and the choices are material to infringement." Dkt. No. 92 at 6. Defendants argue that "a POSITA may reasonably use peak *height* or peak *area* as the measure of peak intensity and this choice has a material effect on the texture coefficients." *Id.* at 7 (citation omitted); *see id.* at 7–9. Defendants also argue that "a POSITA would not know with reasonable certainty whether or not to apply a thin-film correction." Dkt. No. 92 at 9 (citation omitted); *see id.* at 9–10. Further, Defendants submit that "the Texture Coefficient Patents do not specify the slit size that controls the size of the X-ray beam," and "[t]he Texture Coefficient Patents are also silent on sample orientation." *Id.* at 10. Finally, Defendants argue that "[t]he '014 and '706 patents fail to specify the appropriate powder diffraction standard to use for I_0(hkl), and multiple standards existed at the time of these patents." *Id.* at 10–11 (citations omitted).

Plaintiff replies that "[w]hat Defendants needed, but failed to show, is the existence of *multiple known methods* for measuring texture coefficient, not parameters to configure during *one such method*." Dkt. No. 95 at 2; *see id.* at 2–4.

At the May 14, 2025 hearing, the parties presented oral arguments.

(2) Analysis

The *Dow Chemical* case cited by Defendants is unpersuasive. In *Dow Chemical*, the claim term at issue was "slope of strain hardening coefficient" ('SHC')," which was "a new Dow construct, not previously known in the art," defined as "(slope of strain hardening) * $(I_2)^{0.25}$" (wherein I_2 was a "melt index" that was not at issue in the indefiniteness analysis). 803 F.3d at 631. The parties disputed the definiteness of the "slope" of a portion of a stress/strain curve, in which "the force (or load) applied to the sample is plotted on the y-axis, and the resulting elongation (or displacement) of the sample is plotted on the x-axis," and "the behavior of the material claimed by the patent changes as it is stretched, and those changes are shown on the stress/strain curve":

> After the drawing stage, there is a third phase—the strain hardening region—which corresponds to region IV in the figure above. The strain hardening region is the focus of the claim term at issue here. In the strain hardening region, the material hardens, and it stretches much less in response to an increased force than in the drawing region. At first, in the strain hardening region, there is still some drawing effect. As the material continues to stretch, the strain hardening effect increases and the drawing effect decreases. When plotted, the strain hardening region is curved in most instances. Because the strain hardening region is typically curved, it does not have a single slope. Typically, the curve will get steeper as more force is applied.

803 F.3d at 631–632. The indefiniteness analysis in *Dow Chemical* noted three methods known in the art for calculating the slope of strain hardening, and, moreover, "[f]or purposes of this case, Dr. Hsiao [(Dow's expert)] developed yet another method—of his own invention—to calculate the slope of strain hardening":

> Dr. Hsiao's testing produced curves with 1,500 data points representing the force applied to a sample and the sample's elongation. He then analyzed subsets of fifty data points. For each set of fifty data points, Dr. Hsiao used a computer to apply a linear regression routine to fit a line to the fifty points and calculate a slope of the resulting line. He then selected the highest of those resulting slopes in order to find the maximum slope.

Id. at 633. In *Dow Chemical*, Dr. Hsiao testified that "he was not even aware of the other methods at the time he did his analysis." *Id.* The main analysis in *Dow Chemical* is set forth in the final paragraph of the opinion, as follows:

> The claims here are even more clearly indefinite than those in *Teva* [*Pharm. USA, Inc. v. Sandoz, Inc.*, 789 F.3d 1335 (Fed. Cir. 2015)]. Here, Dr. Hsiao's chosen method was not even an established method but rather one developed for this particular case. As we held in *Interval Licensing*, a claim term is indefinite if it "leave[s] the skilled artisan to consult the 'unpredictable vagaries of any one person's opinion.'" 766 F.3d at 1374 (quoting *Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1350 (Fed. Cir. 2005)).[fn] The claims here are invalid as indefinite, and the award of supplemental damages must be reversed. Under these circumstances, we need not address the cross-appeal as to enhanced damages.
>
> [fn:] This case is unlike *Biosig Instruments, Inc. v. Nautilus, Inc.*, 783 F.3d 1374, 1377 (Fed.Cir.2015). In *Biosig*, we held that the prosecution history, the language of the claims, and the knowledge of one skilled in the art demonstrated that "a skilled artisan would understand the inherent parameters of the invention as provided in the intrinsic evidence" and that the claim term at issue "informs a skilled artisan with reasonable certainty of the scope of the claim." *Id.* at 1382–84.

803 F.3d at 635. *Dow Chemical* thus emphasized (if not outright relied upon) the patentee's expert having developed, for purposes of the litigation, his own *sui generis* calculation of the relevant property.

No such concern is present here. Rather, the parties agree that "texture coefficient" or "TC" is a well-known term of art in the context of copper foils. *See, e.g.,* Dkt. No. 89, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶ 133 ("The texture coefficient (TC) of a crystal structure describes how well the crystals in the structure are oriented as compared to a fully random distribution."). The parties agree that the texture coefficient is determined by the following formula:

$$TC(hkl) \geq \frac{\frac{I(hkl)}{I_0(hkl)}}{\frac{1}{n}\sum\frac{I(hkl)}{I_0(hkl)}}$$

Defendants' expert reproduces this formula and submits: "In the TC formula, *n* is the number of X-ray diffraction ('XRD') peaks within a specific range of diffraction angles (2θ); I(*hkl*) is the measured XRD diffraction intensity of an (*hkl*) crystal plane in a sample; and I_0(hkl) is the diffraction strength of an (*hkl*) crystal plane as defined by the applied standard." *Id.* at ¶ 134; *see also* Dkt. No. 92, Ex. 32, Apr. 1, 2025 Arnold dep. at 155:1–3. The parties also agree that diffraction is measured using a common piece of test equipment known as a "diffractometer." *See, e.g.,* Dkt. No. 89, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶ 138; *see id.* at ¶¶ 139–40.

Defendants' expert opines that the patents here at issue fail to provide necessary "analytical and experimental parameters such as: (1) whether to use peak height or peak area as the measure of peak intensity; (2) whether to apply a thin-film correction to the intensity values; (3) the slit size during experimentation, and (4) the orientation of the sample during experimentation," and, for the '014 Patent and the '706 Patent, "(5) the choice of copper powder standard to use for I_0(hkl)." Dkt. No. 89, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶¶ 146, 185, 220.

Plaintiff's expert opines that "the[] disclosures do not set forth whether peak heigh[t] or peak area is used for XRD, whether thin-film correction is applied, or the specific slit size opening, sampling orientation, or a choice of standard copper powder intensity data because a POSITA performing the testing would have known based on the sample being tested and industry norms which configuration to apply." *Id.*, Ex. 8, Mar. 7, 2025 Steingart Decl. ¶ 25.

Thus, the issue here is not like *Dow*, which involved multiple methods, 803 F.3d at 633–34, but rather is a dispute regarding whether the application of the known method is sufficiently clear.

Defendants cite *Sandvik Intellectual Property AB v. Kennametal, Inc.*, No. 2:10-CV-654-TFM, 2012 WL 3027983, at *25–*26 (W.D. Pa. Feb. 16, 2012) (Colen, S.M.), *adopted*, 2012 WL 3028028 (W.D. Pa. July 24, 2012) (McVerry, J.). *Sandvik* considered a dispute involving texture coefficients as to alumina coatings applied to cutting tools. The parties there addressed various X-ray diffraction data collection and analysis parameters, including slit size, thin-film correction, whether to use peak height or peak area, and what standard intensity data to use. *Id.*, at *5. *Sandvik* found that "neither the [p]atent nor the prosecution history provides any description as to how XRD is to be performed or as to how it was performed to determine TC(012) for the claimed invention." *Id.*, at *23. The expert analysis "did not isolate the effect of each data collection and analytical variable," such as whether to use peak height or peak area," but *Sandvik* found that "it is the overall impact of those variables that is relevant, not their individual contributions." *Id.*, at *24 n.14.

Turning to the analytical and experimental parameters identified by Defendants in the present case, Defendants summarize the purported variability as follows:

Choice	Variability in TC Ratios (%)	Variability in TC(220) (%)
Peak height or peak area	19% to 45%	16.4%
Thin film correction	7% to 10%	5.3%
Diffractometer slit size	0.3% to 4.2%	1.4%
Sample orientation	1% to 3%	0.7%

Dkt. No. 92 at 12 (citing Ex. 13, Mar. 7, 2025 Arnold Decl. ¶¶ 182, 217).

As to whether to use peak height or peak area as the measure of peak intensity, Defendants' expert opines, for example that "[d]espite the significance of the choice of peak height or peak area, the '541 patent provides no guidance on whether to use one or the other as the measure of intensity I(hkl)." Dkt. No. 89, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶ 157; *see id.* at ¶ 227 (similar); *see also id.* at ¶ 193 ("Despite the significance of the choice of peak height or peak area, the '014

patent provides no guidance and a POSITA in September 2017 would have chosen either of them, thus affecting measured I(hkl) and calculated TC(220) values.").

Plaintiff's expert opines that using peak area is generally more accurate than using peak height:

> In my opinion, a POSITA at the time of the inventions would have known to use the peak area as a measure of intensity in XRD. Specifically, a POSITA would have known that the peak area represents the true sum of all the diffracted X-ray photons that have been detected regardless of the peak shape and is therefore the correct measure of intensity.[fn] Further, a POSITA would have recognized at the time of the inventions that peak area, as opposed to peak height, is not sensitive to changes in slit opening and thus would be the measure of intensity of choice in this scenario.
>
> [fn: http://pd.chem.ucl.ac.uk/pdnn/peaks/peakcon.htm ("The peak area is generally taken to be synonymous with 'peak intensity' since the area represents the true sum of all the diffracted X-ray photons […] that have been detected regardless of the peak shape.")

Dkt. No. 89, Ex. 8, Mar. 7, 2025 Steingart Decl. ¶ 26. In deposition, Defendants' expert was, not surprisingly, reluctant to agree outright, but Defendants' expert did not present peak height and peak area as equally accurate and, to at least some degree, acknowledged that peak area can be more accurate:

> Q Okay. Now, starting with the -- the choice of peak height or peak area, and that's -- I think you have a subsection one, it starts on page 48 of your declaration.
> A Yes.
> Q Okay. You -- in your paragraph 152 you – you say that "both peak height and peak area are common ways to measure intensity," correct?
> A Yes.
> Q But you also say that -- or I should say you quote a document that says that "Although peak height may be used as a qualitative measure of relative intensity, the most accurate measure of intensity relationships in a patent is the area minus background under the peaks."
> A That's what that particular reference said, yes.
> Q Okay. So you agree that --
> A But --
> Q I'm sorry to interrupt you.
> A Sorry. That is quoting the reference specifically.
> Q Okay. So you agree that the most accurate measure of the intensity relationship is the peak area?

> A I think it could depend on certain situations, I would say, generally speaking, but there could be certain specific instances where that is not necessarily correct.
> Q Okay. Generally speaking, the peak area is the more accurate measure?
> A Again, I think in the -- in the specific instances one might typically consider that to be more accurate.

Dkt. No. 92, Ex. 32, Apr. 1, 2025 Arnold dep. at 158:17–160:6.

At the May 14, 2025 hearing, Defendants argued that a person of skill in the art might choose either peak height or peak area because although some literature says that peak area is more accurate, using peak height can be easier and faster.

On balance, Defendants' expert, while not directly acknowledging peak area as being what a person of skill would know to choose, has not persuasively countered the persuasive opinion of Plaintiff's expert that a person of ordinary skill in the art would choose peak area because peak area is generally more accurate. Also of note, Defendants' expert has himself cited evidence as stating that "[a]lthough peak height may be used as a qualitative measure of relative intensity, the most accurate measure of intensity relationships in a pattern is the area (minus background) under the peaks." Dkt. No. 89, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶ 152.

Defendants have also cited inventor testimony on this issue (Dkt. No. 92 at 7–8), but inventor testimony is of little if any relevance in these claim construction proceedings. *See Howmedica Osteonics Corp. v. Wright Med. Tech., Inc.*, 540 F.3d 1337, 1346–47 (Fed. Cir. 2008) (inventor testimony is "limited by the fact that an inventor understands the invention but may not understand the claims, which are typically drafted by the attorney prosecuting the patent application").

As to whether to apply a "thin-film correction" to the intensity values, this refers to an adjustment to diffractometer data that can be used for very thin foils to account for X-rays that completely penetrate the sample. Dkt. No. 89, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶ 159. Plaintiff's

expert opines that whether or not a thin-film correction is used "would not have been material to the claimed 'texture coefficient' values, so whether thin-film corrections are applied have little impact, if any at all." Dkt. No. 89, Ex. 8, Mar. 7, 2025 Steingart Decl. ¶ 27. Defendants' expert opines that the choice as to whether to apply a thin-film correction can affect the TC by up to 10% for the '541 Patent and by up to 5.3% for the '014 Patent and the '706 Patent. Dkt. No. 89, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶¶ 161–64, 195–98 & 231.

This choice, however, depends on the particular thickness of the sample being tested. Defendants themselves submit that "*Dr. Arnold performed his analysis on an 8 μm foil*, but the thin-film correction would be much more pronounced for *thinner foils within the scope of the claims (e.g., 1 μm)*." Dkt. No. 92 at 9 (emphasis added) (citing Dkt. No. 89, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶ 161; citing '541 Patent, Cl. 4). Defendants' argument is therefore unpersuasive because the purported variabilities of up to 10% for the '541 Patent and by up to 5.3% for the '014 Patent and the '706 Patent pertain to foil that is eight times thicker than the thinnest foil recited by dependent Claim 4 of the '541 Patent. Also, the "judgment call" of whether to apply a thin-film correction depends on whether the foil is so thin that a substantial portion of the X-rays completely penetrate the foil, and making that decision would be within the ken of a person of skill in this art. *See* Dkt. No. 92, Ex. 32, Apr. 1, 2025 Arnold dep. at 162:15–23; *see id.* at 160:14–162:14. The *Sandvik* decision cited by Defendants is in general accord, stating that "[t]he fact that decisions had to be made during collection and analysis of the XRD data does not necessarily implicate indefiniteness of the claims." 2012 WL 3027983, at *24.

As to the "aperture" or "slit" size during measurement, Defendants' expert cites test data in which the choice of slit size affected the TC ratios of the '541 Patent by up to 4.2% and affected

the TC(220) of the '014 Patent and the '706 Patent by up to 1.4%. Dkt. No. 89, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶¶ 170–72 & 202–04; *see* Dkt. No. 89, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶ 159.

Defendants' own cited authority, however, explains that selection of slit size depends upon the dimensions of the particular sample being tested and, at least in part, slit size is selected so as to avoid "'spill-over,' where the X-ray beam spills over the edge of the sample." *Sandvik*, 2012 WL 3027983, at *4 (citations omitted); *see id.*, at *5 ("When the slit size becomes too large, spill-over of the incident beam may occur.") (citations omitted). Although *Sandvik* considered slit size as part of considering "overall impact" of several factors, this analysis in *Sandvik*, coupled with the above-cited relatively small percentage variations identified by Defendants' expert here, demonstrates that, at least for purposes of the present case, appropriate selection of slit size for XRD of copper foil samples is within the ken of a person of skill in the art. Also, as discussed above, Plaintiff's expert persuasively opines that peak area would be used rather than peak height, and Plaintiff's expert further opines that "peak area, as opposed to peak height, is not sensitive to changes in slit opening . . . ." Dkt. No. 89, Ex. 8, Mar. 7, 2025 Steingart Decl. ¶ 26.

As to the orientation of the sample during experimentation, Defendants' expert cites testing in which whether the sample is oriented in the transverse direction (TD) or machine direction (MD) affected the TC ratios of the '541 patent by up to 2.7% and affected the TC(220) of the '014 Patent and the '706 Patents by up to 0.7%. Dkt. No. 89, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶¶ 175–80, 206–11, 234; *see id.* at ¶ 176 ("The machine direction ('MD') is the direction in which the electrolytic copper foil is wound during manufacture. The transverse direction ('TD') is the direction along the width of the electrolytic copper foil as it is wound during manufacture, orthogonal to the MD.").

Defendants' argument regarding measurement direction is unpersuasive. First, Defendants' do not persuasively show that a variation of 0.7% to 2.7% is significant in the present case. Second, the claims here at issue are explicit as to the scope of the recited physical properties, and any disputes regarding whether a particular accused instrumentality is within that scope pertain to factual issues regarding infringement rather than any legal question of indefiniteness. *See SmithKline Beecham Corp. v. Apotex Corp.*, 403 F.3d 1331, 1340–41 (Fed. Cir. 2005) ("The test for indefiniteness does not depend on a potential infringer's ability to ascertain the nature of its own accused product to determine infringement, but instead on whether the claim delineates to a skilled artisan the bounds of the invention. In this case, the problem for Apotex is that it cannot accurately ascertain the nature of its own product. The scope of this claim is clear; the infringement of the Apotex product is not.").

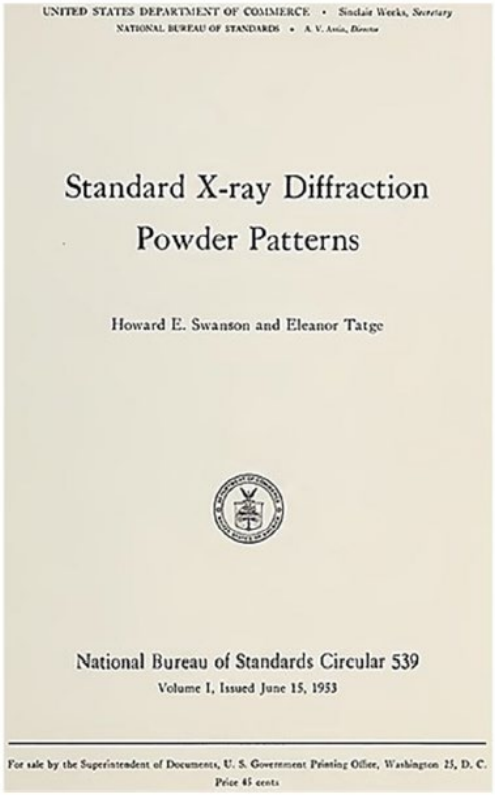
As to the standard for I_0, Defendants' expert opines that many different applicable standards are available. *See* Dkt. No. 89, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶¶ 141–43. The *Sandvik* case cited by Defendants involved alumina rather than copper, but here as in *Sandvik* there were two standard Powder Diffraction File ("PDF") data sets (referred to as PDF "cards") identified as having the highest quality, and *Sandvik* found that a person of skill in the art would have selected one of those two. 2012 WL 3027983, at *27. *Sandvik* nonetheless found indefiniteness as to the standard diffraction data, noting that the patentee "acknowledge[d] that these two different cards will result in different TC(012) being determined." *Id.*, at *28.

Sandvik is distinguishable, however, because here one of Defendants' experts, Dr. Josefowicz, opined as follows in IPR proceedings when discussing the "Kim" reference:

> 73. Regarding the X-ray diffraction normalization standards, to my knowledge, *the most relevant one used for copper is the ICDD 04-0836 standard which is also known by its former name JCPDS 04-0836.* This standard is based, ultimately on Standard X-ray Diffraction Powder Patterns from the National Bureau of Standards

Circular 539 (see below). The standard normalization peaks I_0 for the (111), (200), and (220) planes of copper are 100, 46, and 20. SOLUS-1005, 20, Table 5 (reproduced below, annotated).

NBS Circular #539, Vol. 1 Standard X-ray Diffraction Powder Patterns UNITED STATES DEPARTMENT OF COMMERCE NATIONAL BUREAU OF STANDARDS Pp. 16



UNITED STATES DEPARTMENT OF COMMERCE • Sinclair Weeks, Secretary
NATIONAL BUREAU OF STANDARDS • A. V. Astin, Director

Standard X-ray Diffraction Powder Patterns

Howard E. Swanson and Eleanor Tatge

National Bureau of Standards Circular 539
Volume I, Issued June 15, 1953

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.
Price 45 cents

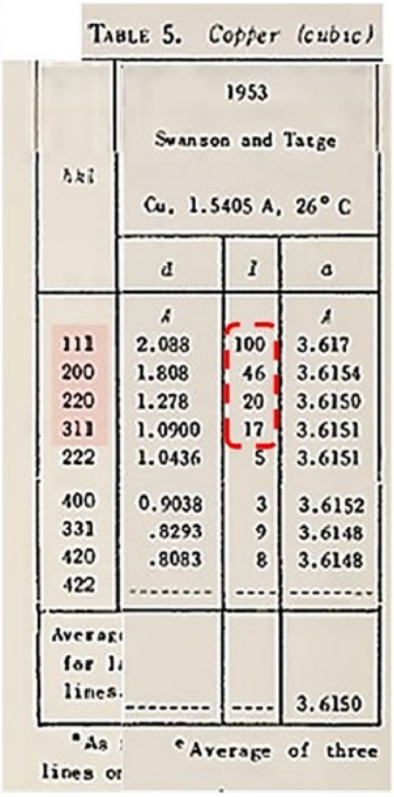


TABLE 5. Copper (cubic)

hkl	1953 Swanson and Tatge Cu, 1.5405 A, 26° C d	I	a
	Å		Å
111	2.088	100	3.617
200	1.808	46	3.6154
220	1.278	20	3.6150
311	1.0900	17	3.6151
222	1.0436	5	3.6151
400	0.9038	3	3.6152
331	.8293	9	3.6148
420	.8083	8	3.6148
422	--------	----	--------
Average for l lines.	--------	----	3.6150

*As lines or

*Average of three

SOLUS-1005, Table 5 (annotated)

74. Kim does not explicitly mention specific X-ray diffraction peak intensities nor a specific normalization standard, but does recite the exact same equation for the texture coefficient (SOLUS-1018, 2) as recited by the '541 Patent. Even if an alternative standard for normalizing the peak intensities was used, other than the *JCPDS 04-0836* standard cited in the Information Disclosure Statement filed with the application, the values of the standard intensity peaks do not vary much from one update to another. SOLUS-1001, 1; SOLUS-1002, 571. A previous standard, the JCPDS 98-062-7113, recited normalization values which differed from those of the JCPDS 04-0836 standard by at most 12%. Even applying this largest percentage shift in a normalized peak intensity to all three of the peaks involved, the variations would still not [be] sufficient to change the outcome that Kim's second film of Kim's Table 1 has X-ray diffraction texture coefficients which are within the claimed ranges.

Dkt. No. 89, Ex. 11, Oct. 3, 2024 Josefowicz Decl. ¶¶ 73–74 (emphasis added).

Although Plaintiff has not argued that this gives rise to any estoppel, Defendants' indefiniteness argument in the present case is not credible when considering this prior opinion of one of their experts that JCPDS 04-0836 is the "most relevant" standard, *id.* at ¶ 73, particularly when considering that Defendants have the burden of showing indefiniteness and must do so by clear and convincing evidence. *Sonix*, 844 F.3d at 1377. This expert's mention of JCPDS 98-062-7113 (quoted above), emphasized here by Defendants, does not undermine the expert's statement regarding the "most relevant" standard. Dkt. No. 89, Ex. 11, Oct. 3, 2024 Josefowicz Decl. ¶ 73.

Finally, the named inventors used JCPDS 04-0836 when performing calculations regarding the "Hirose" reference during prosecution of the '541 Patent. Dkt. No. 89, Ex. 12, Amendment Under 37 C.F.R. § 1.111 at 8. Although this is not intrinsic evidence as to the '014 Patent and the '706 Patent, this is consistent with the above-reproduced opinion of Defendants' own expert and is therefore noteworthy extrinsic evidence. The opinion of Plaintiff's expert is further persuasive in this regard. *See* Dkt. No. 89, Ex. 8, Mar. 7, 2025 Steingart Decl. ¶ 30. The contrary opinions of Defendants' expert regarding these terms are unpersuasive in light of the foregoing. *See* Dkt. No. 89, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶¶ 212–16, 230(a), 234. The opinion of Plaintiff's expert, that a person of skill at the relevant time would have used JCPDS 04-0836, is persuasive. Dkt. No. 89, Ex. 8, Mar. 7, 2025 Steingart Decl. ¶ 30.

The Court therefore hereby expressly rejects Defendants' indefiniteness argument. Defendants present no alternative proposed constructions, and no further construction is necessary.

The Court accordingly hereby construes these disputed terms to have their **plain meaning**.

C. Roughness (Terms No. 5, 9, 17, 21, 22, 25, 26)

"surface roughness (Rz_{JIS}) of 2 µm or less" ('541 Patent, Claim 2)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Not indefinite	Indefinite
"ten-point mean roughness Rz_{JIS} of 2 µm or less" ('090 Patent, Claim 3)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Not indefinite	Indefinite
"a surface roughness (Rz) of 3.5 µm or less" ('689 Patent, Claim 1)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Not indefinite	Indefinite
"Rz" ('706 Patent, Claim 1)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Not indefinite	Indefinite
"a difference (|Δ(Rz/Ra)|) between Rz/Ra at the first surface of the electrolytic copper foil and Rz/Ra at the second surface of the electrolytic copper foil is less than 2.42" ('706 Patent, Claim 1)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Not indefinite	Indefinite
"Rz/Ra at the second surface is 4.2 to 9.0" ('706 Patent, Claim 2)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Not indefinite	Indefinite

"Rz/Ra at the S surface of the electrolytic copper foil is 5.1 to 6.8" ('706 Patent, Claim 3)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Not indefinite	Indefinite

Dkt. No. 89 at 16–17; Dkt. No. 97, Ex. A at 7, 10, 19, 22, 23 & 25–27.

Shortly before the start of the May 14, 2025 hearing, the Court provided the parties with the following preliminary construction for these terms: "Plain meaning [not indefinite]."

(1) The Parties' Positions

Plaintiff submits that Defendants assert these terms are indefinite because of variability based on choice of standard, choice of profilometer, and choice of sampling location. Dkt. No. 89 at 17. Plaintiff argues that choice of standard is addressed by express claim language. *Id.* at 18. Plaintiff also argues that although Defendants contend that choosing one brand of profilometer or another brand of profilometer might create different results, the mere possibility of different results from different measurements does not give rise to indefiniteness. *Id.* at 19 (citation omitted). As to potential variation between different sampling locations, Plaintiff argues that "Defendants confuse indefiniteness—an issue for claim construction—with the infringement determination—an issue for trial." *Id.* at 20. Plaintiff urges that "the claim language is unequivocal that, so long as three randomly selected points fall within the claimed range, the product infringes," and "[t]he fact that other points may fall outside the scope of the claims is immaterial." *Id.* (citing, e.g., *Takeda Pharm. Co. v. Zydus Pharms. USA, Inc.*, 743 F.3d 1359, 1362, 1366–67 (Fed. Cir. 2014); *Ningde Amperex Tech. Ltd. v. Zhuhai CosMX Battery Co.*, No. 2:22-CV-00232-JRG, 2023 WL 6930328, at *2 (E.D. Tex. 2023) (Gilstrap, J.)).

Defendants respond that these terms are indefinite because "a POSITA would not know with reasonable certainty which standard to apply, and the choice of standard has a significant effect on the measured values." Dkt. No. 92 at 13; *see id.* at 13–20. Defendants also argue that the choice of profilometer and the choice of measurement locations significantly affect the measurements. *Id.* at 20–21.

Plaintiff replies, as to the '689 Patent, that neither prior art nor extrinsic evidence can change the plain meaning of Rz as referring to the sum of the highest peak and the lowest valley. Dkt. No. 95 at 4–5. Plaintiff also argues that "[t]he '706 Patent plainly states 'Rz indicates ten-point average roughness.'" *Id.* at 5. Further, Plaintiff argues that "Defendants cite no authority for the proposition that the Rz_{JIS} terms measured using the *same tool* (profilometer) following the *same standard* (JIS B 0601) could nevertheless be indefinite due to different *versions* of said standard used (1994 vs 2001)." *Id.* at 5. Plaintiff argues that "[t]he '541 and '090 patents were filed in 2010 or later, so a POSITA would know to follow the 2001 version." *Id.* at 5–6 (citation omitted).

At the May 14, 2025 hearing, the parties presented oral arguments.

(2) Analysis

As to choice of profilometer, Defendants' expert opines regarding test data differences between a Mitutoyo "SJ-310" profilometer and a Mahr "M300" profilometer, differing by up to 47% for Rz_{DIN} and up to 67% for Rz_{JIS}. Dkt. No. 89, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶ 73; *see id.* at ¶¶ 31 & 54. Defendants' argument is unpersuasive because while variations in measurements between two different brands of profilometer perhaps demonstrate the accuracy limitations of the measurement technology, such variations do not give rise to indefiniteness. *See Takeda*, 743 F.3d at 1362, 1366–67 (regarding limitation of "fine granules having an average particle diameter of

400 μm or less," "we do not believe that the mere possibility of different results from different measurement techniques renders [the claim] indefinite"); *see also Ball Metal*, 838 F. App'x at 542 (relying on *Takeda* after *Nautilus*); *SmithKline Beecham Corp. v. Apotex Corp.*, 403 F.3d 1331, 1340–41 (Fed. Cir. 2005).

As to choice of sampling locations, Defendants' expert opines that, based on Plaintiff's own test data, "three randomly selected points could be within the claimed range and another three randomly selected points could be outside of the claimed range." Dkt. No. 89, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶ 116. The *SmithKline* case cited by Plaintiff is persuasive that Defendants' argument pertains to infringement analysis, not indefiniteness. *See SmithKline*, 403 F.3d at 1340–41 ("The test for indefiniteness does not depend on a potential infringer's ability to ascertain the nature of its own accused product to determine infringement, but instead on whether the claim delineates to a skilled artisan the bounds of the invention. In this case, the problem for Apotex is that it cannot accurately ascertain the nature of its own product. The scope of this claim is clear; the infringement of the Apotex product is not."). Plaintiff also persuasively argues that persons of ordinary skill in the art routinely rely on experimental test results even though the results are subject to variability. *Cf. Erfindergemeinschaft UroPep GbR v. Eli Lilly & Co.*, 240 F. Supp. 3d 605, 627, 632 (E.D. Tex. 2017) (Bryson, J., sitting by designation) ("Lily argues that, because of differing experimental conditions, the calculated IC_{50} value for a particular compound can vary," but noting "standard practice . . . to calculate selectivity ratios based on . . . experiments," and ". . . persons of skill in the art relied on selectivity ratios calculated from the results of experiments . . .").

On balance, any challenge regarding Plaintiff's choice of sampling locations for its infringement analysis is a factual question of infringement, not a legal question for claim construction.

As to choice of standard, the parties dispute whether the appropriate standard is "Rz_{DIN}" (also referred to as "Rz(DIN)") or "Rz_{JIS}" (also referred to as "Rz(JIS)"). Defendants' expert submits:

> "Rz(DIN)" calculates surface roughness Rz based on the height difference between the tallest peak and lowest valley over the sampling length. By contrast, "Rz(JIS)" calculates surface roughness Rz based on the average of the five highest peaks and five lowest valleys over the sampling length.

Dkt. No. 89, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶ 23.

By way of background, Defendants submit:

> The "Rz" standards have evolved over time, resulting in confusion and ambiguity that persists to this day. The 1994 version of the Japanese Industrial Standards ("JIS 1994") defines "Rz" as the "ten-point mean roughness" because it is based on the average of ten points in each sampling length. The 2001 version of JIS ("JIS 2001"), by contrast, defines "Rz" as the "average maximum height of profile" based on a definition from the German DIN 4768 standard; therefore, "Rz" as used in JIS 2001 is sometimes referred to as "RzDIN." However, recognizing that the former "ten-point mean roughness" definition of "Rz" from JIS 1994 remained "widely popularized" in Japan, JIS 2001 includes a separate definition of "RzJIS" in an appendix. Thus, it is recognized in the industry that "Rz has different definitions based on the standard that you are working with."

Dkt. No. 92 at 14–15 (citations omitted).

Different patents-in-suit present slightly different disputes on this issue.

As to the '541 Patent, the term at issue is "surface roughness (Rz_{JIS}) of 2 μm or less," which expressly recites RZ_{JIS}. As to the '090 Patent, the term at issue is "ten-point mean roughness Rz_{JIS} of 2 μm or less," which not only expressly recites RZ_{JIS} but also confirms that the particular method is "ten-point mean." The specifications are consistent with this understanding. *See* '090 Patent at 4:32–33 ("Here, roughness of the shiny surface 111a and the matte surface 111b means a ten-point mean roughness (R_{zJIS})."); *see also id.* at 4:56–5:18 (referring to "the ten-point mean roughness R_{zJIS}"); *id.* at 6:28–51 (same); '541 Patent at Abstract, 2:23–24 ("Preferably, the copper foil has a

surface roughness (RJIS) of 2 um or less.") & 4:20–21 ("Surface roughness (R_z) of the copper foil should be 2 μm or less, based on JIS (Japanese Industrial Standards).").

Defendants argue that "both JIS 1994 and JIS 2001 were in use as of [the] patents' respective priority dates and may have been reasonably selected by a POSITA." Dkt. No. 92 at 19.

The '541 Patent and the '090 Patent bear priority dates in 2010 and 2015, respectively, and Plaintiff's expert persuasively opines that, at that time, the applicable standard was JIS 2001. Dkt. No. 89, Ex. 8, Mar. 7, 2025 Steingart Decl. ¶ 54 ("a POSITA would have understood at the time of the invention that Rz and Rz JIS are well-defined parameters in the JIS B 0601 (2001) standards through their respective equations"). Defendants' reliance on purportedly ambiguous usage of "Rz" in the art is unpersuasive (*see* Dkt. No. 92 at 19), particularly in light of the burden being on Defendants to demonstrate indefiniteness by clear and convincing evidence. *Sonix*, 844 F.3d at 1377.

As to the '706 Patent (which has a priority date in 2018), the terms at issue recite "Rz," but the specification expressly states that "Rz" in that patent refers to the "ten-point average roughness":

> *In the present disclosure*, it is preferable for the difference between Rz/Ra at the first surface of the electrolytic copper foil 100 and Rz/Ra at the second surface of the electrolytic copper foil 100, i.e. |Δ(Rz/Ra)|, which is the surface shape factor, to be less than 2.42. *Here, Rz indicates ten-point average roughness*, and Ra indicates arithmetical average roughness. . . .
>
> In the present disclosure, Rz and Ra may be measured according to JIS B 0601(2001) standards, and PD may be measured according to ASME B46.1 standards.

'706 Patent at 4:22–35 (emphasis added). Defendants argue that "ten-point average roughness" could refer to Rz_{DIN} or to RZ_{JIS} because "[t]his phrase, and similar language, is commonly used to refer to both RzDIN (because it is based on an average of ten points per *evaluation* length) and

RzJIS (because it is based on an average of ten points per *sampling* length)." Dkt. No. 92 at 17. The above-reproduced disclosure, however, states that "Rz indicates ten-point average roughness" without any reference to an evaluation length or to multiple sampling lengths. *Id.* Additional disclosure in the specification is consistent with this understanding:

> Surface Profile of Copper Foil
>
> Rz and Ra were measured according to JIS B 0601 (2001) standards using a stylus tip from Mitutoyo Company, the model name of which was SJ-310 and which had a radius of 2 μm, under a condition of a measurement pressure of 0.75 mN. At this time, the measurement length, excluding the cut-off length, was 4 mm, the cut-off length was 0.8 mm at the first stage and the last stage, and the average of the values obtained by performing the measurement three times was taken.

'706 Patent at 8:26–35.

The '706 Patent thus defines "Rz" as being "Rz_{JIS}" for purposes of the '706 Patent. *See Phillips*, 415 F.3d at 1316. Moreover, even if these disclosures were deemed to fall short of setting forth a definition, these disclosures would inform the reading of the claims by a person of ordinary skill in the art. *Id.* at 1313 ("the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification"). Defendants' argument that "the JIS 2001 standard never uses the term 'Rz' to refer to RzJIS" (Dkt. No. 92 at 16) is unpersuasive, particularly in light of the patentee referring to "ten-point average roughness." '706 Patent at 4:22–35.

Defendants also argue that Plaintiff's infringement contentions demonstrate confusion because the contentions rely on $Rz_{DIN,}$ but any such issue regarding the contentions pertains to factual issues regarding infringement rather than giving rise to any purported indefiniteness.

Finally, Defendants argue that "the Court should also reject SKN's latest position that 'Rz' refers to Rz_{JIS} because SKN forfeited it by failing to disclose it timely." Dkt. No. 92 at 18 (citations omitted). Dkt. No. 89 at 18. Defendants' untimeliness argument is unpersuasive when considering

that Defendants are asserting indefiniteness, and have the burden on that issue, together with considering that Defendants have had opportunities to address Plaintiff's arguments by filing a responsive brief and by presenting oral arguments. Defendants' suggestion that Plaintiff's interpretation is contrary to its expert's opinions is also unpersuasive in light of the above-reproduced disclosure in the specification regarding the meaning of "Rz" in this particular patent. Further, the cited opinions refer to several patents and to the art generally, not just the '706 Patent. *See id.* (citing Dkt. No. 89, Ex. 8, Mar. 7, 2025 Steingart Decl. ¶¶ 48–49).

As to the '689 Patent, the term at issue is "a surface roughness (Rz) of 3.5 μm or less," thus referring generically to "Rz." The specification twice refers to "U.S. standard ASME B46.1-2009," '689 Patent at 4:16–17 & 7:47–51, and Defendants' expert acknowledges that "ASME B 46.1 (2009) defines 'Rz' consistently with Rz(DIN)." Dkt. No. 89, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶ 24(d). Defendants' expert also agrees that the priority date for the '689 Patent is in 2016 and that it was "likely" that a person of skill in the art would have understood that Rz_{DIN} was the appropriate standard for measuring "Rz" at that time, in 2016. *See* Dkt. No. 92, Ex. 32, Apr. 1, 2025 Arnold dep. at 101:20–105:10. Defendants argue that "skilled artisans in this field favor using Rz_{JIS} or Rz_{DIN}, rather than 'Rz' alone, in order to avoid ambiguity" (Dkt. No. 92 at 16 (citations omitted)), but this does not demonstrate indefiniteness. Defendants' reliance on purportedly ambiguous usage of "Rz" in the art is also unpersuasive (*see* Dkt. No. 92 at 15), particularly in light of the burden being on Defendants to demonstrate indefiniteness by clear and convincing evidence. *Sonix*, 844 F.3d at 1377.

Finally, even if, despite the foregoing, any ambiguity remains as to using the height difference between the tallest peak and lowest valley over the sampling length (Rz_{DIN}) or instead

using a ten-point average over the sampling length (Rz_{JIS}), Defendants do not present sufficient evidence of materiality as to the '689 Patent. Defendants' expert opines:

> 72. Standard (Rz(DIN) vs. Rz(JIS)): The testing also showed significant differences between Rz(DIN) and Rz(JIS) measurements, up to **65%** for measurements with the SJ-310 and up to **107%** for measurements with the Mahr, as summarized in the table below. For example, for the 3rd-Party Foil (2), the choice of Rz(DIN) or Rz(JIS) affected whether the Rz value was inside or outside of the claimed range (0 to 3.5 µm).

Dkt. No. 89, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶ 72. Thus, as to the '689 Patent, Defendants' expert presents an opinion of results being both inside or outside of the claimed range as to only the "3rd-Party Foil (2)." *Id.* at ¶¶ 72 & 108. Plaintiff replies that this "3rd-Party" foil is not one of the accused products, stating that "[t]he only samples that fall outside the claimed ranges are 3rd-Party Foils, none of which have even been accused of infringement." Dkt. No. 95 at 6 n.5. In deposition, Defendants' expert testified as to having no knowledge regarding third-party foils:

> Q. Okay. So collectively, for purposes of test results, you looked at a combination of what we'll call three umbrellas, the SKN testing, your testing of SKN copper foils, and your testing of third-party copper foils?
> A I think that's fair -- a fair way to describe it.
> Q Got it.
> A I think that is a fair way to describe it.
> Q And with respect to the third-party, who was the third-party copper foils that were tested?
> A Honestly, I don't recall, off the top of my head here. I don't recall that answer, off the top of my head.
> Q Okay, but they're not copper foils of the Defendants, correct?
> A To be honest, I can't remember – I can't remember that point or not.
> Q Okay.
> A I can't speak to that. I -- yeah, I don't remember.
> Q Okay. But just generally if you refer to them as third-party, most likely wouldn't make sense for them to be Defendants?
> A Probably; however, I can't remember right now, sitting on the spot here.
> Q Okay. Got it.
> A Yes.
> Q But you don't know, for example, how those third-party samples were chosen?
> A I honestly don't recall on that. I don't recall how they were chosen.
> Q Do you know who chose them?

> A This was a while back. I don't remember who chose them. This was a while back. Yeah, I'm sorry, I'm not remembering on that front.
> Q Okay. And do you know if these third-party copper foils have ever been accused of infringing any of the asserted patents?
> A Again, I don't believe so, but I don't believe that's the case, but I don't know for sure.

Dkt. No. 92, Ex. 32, Apr. 1, 2025 Arnold dep. at 53:18–55:15.

Thus, as to the '689 Patent, Defendants' indefiniteness argument fails for the additional reason that Defendants do not present sufficient evidence regarding products as to which there are purportedly "materially different outcomes" in the present case. *Ball Metal*, 838 F. App'x at 542 ("Under court case law, then, a claim may be invalid as indefinite when . . . (3) application of the different methods result in materially different outcomes for the claim's scope such that a product or method may infringe the claim under one method but not infringe when employing another method.") (discussing, e.g., *Dow*, 803 F.3d at 634).

In sum, the Court rejects Defendants' indefiniteness arguments as to all four of the patents here at issue. Defendants present no alternative proposed constructions, and no further construction is necessary.

The Court accordingly hereby construes these disputed terms to have their **plain meaning**.

D. Peak Count Roughness Terms (Terms No. 7, 8)

"each of the first and second surfaces has a peak count roughness Rpc of 10 to 100, wherein the peak count roughness Rpc of each of the first and second surfaces is an average of peak count roughness Rpc values measured at randomly-selected three points, the peak count roughness Rpc of each point is the number of effective peaks which rise above an upper criteria line of 0.5 μm per unit sampling length of 4 mm in a surface roughness profile obtained according to steel-iron test schedule (SEP 1940), and there is at least one valley deeper than a lower criteria line of -0.5 μm between adjacent ones of the effective peaks" ('090 Patent, Claim 1)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Not indefinite	Indefinite
"a difference in peak count roughness Rpc between the first and second surfaces is 60 or less" ('090 Patent, Claim 2)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Not indefinite	Indefinite

Dkt. No. 89 at 22–23; Dkt. No. 97, Ex. A at 9–10.

Shortly before the start of the May 14, 2025 hearing, the Court provided the parties with the following preliminary construction for these terms: "Plain meaning [not indefinite]."

(1) The Parties' Positions

Plaintiff argues that "[t]he term 'peak count roughness' (i.e., 'Rpc') is a well-understood property of battery copper foil, and expressly defined in claim 1 of '090 Patent." Dkt. No. 89 at 23. Plaintiff also argues that "the claim language is unequivocal that, so long as the peak count roughness is within the claimed range, the product infringes," and "[t]he fact that sampling at certain locations may yield a result that falls outside the scope of the claims is immaterial and does not render the claims indefinite." *Id.* at 24 (citations omitted).

Defendants respond that "Claim 1 of the '090 patent is indefinite because it has two contradictory 'reference lengths' for 'peak count roughness Rpc.'" Dkt. No. 92 at 25.

At the May 14, 2025 hearing, the parties presented oral arguments.

(2) Analysis

Claim 1 of the '090 Patent recites (emphasis added):

> 1. An electrolytic copper foil for a secondary battery, the electrolytic copper foil comprising:
> a first surface; and
> a second surface opposite to the first surface,
> wherein each of the first and second surfaces has a peak count roughness Rpc of 10 to 100,
> wherein the peak count roughness Rpc of each of the first and second surfaces is an average of peak count roughness Rpc values measured at randomly-selected three points,
> the peak count roughness Rpc of each point is the number of effective peaks which rise above an upper criteria line of 0.5 μm per unit *sampling length of 4 mm* in a surface roughness profile obtained according to *steel-iron test schedule (SEP 1940)*, and
> there is at least one valley deeper than a lower criteria line of −0.5 μm between adjacent ones of the effective peaks.

Defendants argue that this claim is internally inconsistent, and therefore indefinite, because whereas the claim recites a "sampling length of 4 millimeters," the recited "test schedule (SEP 1940)" specifies a "reference length" of 1 centimeter. Dkt. No. 89, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶ 38.

No inconsistency is apparent because whereas the claim expressly recites "sampling" length, SEP 1940 specifies a "reference" length. Defendants' expert acknowledges this distinction. *See id.* at ¶ 21; *see id.* (also discussing "evaluation length" and "traversing length"); *see also* Dkt. No. 92, Ex. 32, Apr. 1, 2025 Arnold dep. at 65:14–20 ("Q And if you have a 4 millimeter sampling length, then one can normalize that to meet the [1 centimeter] reference length simply by multiplying it by 2.5, correct? A If one wanted to renormalize, one could multiply by 2.5 to

renormalize to a different reference."). Even if this amounts to inartful claim drafting, the indefiniteness opinion of Defendants' expert is unpersuasive, particularly when viewed in light of the presumption of validity. *See* Dkt. No. 89, Ex. 7, Mar. 7, 2025 Arnold Decl. ¶¶ 35–42; *see also Sonix*, 844 F.3d at 1377 ("Indefiniteness must be proven by clear and convincing evidence.").

As for Defendants' indefiniteness opinion based on variation depending on selection of measurement points, the *SmithKline* case cited by Plaintiff is persuasive that Defendants' argument pertains to infringement analysis, not indefiniteness. *See SmithKline*, 403 F.3d at 1340–41 ("The test for indefiniteness does not depend on a potential infringer's ability to ascertain the nature of its own accused product to determine infringement, but instead on whether the claim delineates to a skilled artisan the bounds of the invention. In this case, the problem for Apotex is that it cannot accurately ascertain the nature of its own product. The scope of this claim is clear; the infringement of the Apotex product is not.").

The Court therefore hereby expressly rejects Defendants' indefiniteness argument. Defendants present no alternative proposed construction, and no further construction is necessary.

The Court accordingly hereby construes these disputed terms to have their **plain meaning**.

E. Peak Density/Count Terms (Terms No. 15, 23, 28)

"peak count (Pc)" ('689 Patent, Claim 1)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Not indefinite; plain and ordinary meaning	"the average of three values of the number of effective peaks which rise above a 0.5 μm upper criteria line per 4 mm unit sample length in a surface roughness profile obtained according to U.S. standard ASME B46.1-2009, where at least one valley deeper than a -0.5 μm lower criteria line C2 exists between adjacent effective peaks among the effective peaks" Alternatively: Indefinite
"a peak count (Pc) of each of the first and second surfaces of the electrolytic copper foil ranges from 3 to 92" ('689 Patent, Claim 1)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Not indefinite	Indefinite

Dkt. No. 89 at 24; Dkt. No. 92 at 27; Dkt. No. 97, Ex. A at 16–17.

Shortly before the start of the May 14, 2025 hearing, the Court provided the parties with the following preliminary constructions for these terms, respectively: "the average of three values of the number of effective peaks which rise above a 0.5 μm upper criteria line per 4 mm unit sample length in a surface roughness profile obtained according to U.S. standard ASME B46.1-2009, where at least one valley deeper than a -0.5 μm lower criteria line C2 exists between adjacent effective peaks among the effective peaks"; and "Plain meaning (apart from the Court's construction of 'peak count (PC),' above)."

(1) The Parties' Positions

As to the "peak count" terms, Plaintiff argues that "peak count" is a well-known term of art and that "[a] POSITA at the time of the inventions would have known that the plain and ordinary meaning of 'peak count' is 'the number of peaks per unit length of a roughness profile that subsequently intersects a lower boundary line and an upper boundary line.'" Dkt. No. 89 at 25 (citations omitted). Plaintiff argues that Defendants are attempting to import various limitations from the specification. *Id.* Further, Plaintiff argues that "the claim language is unequivocal that, so long as the peak count is within the claimed range, the product infringes," and "[t]he fact that sampling at certain locations may yield a result that falls outside the scope of the claims is immaterial and does not render the claims indefinite." *Id.* (citations omitted).

Defendants respond that "[u]nlike the '090 patent, which is internally inconsistent as to the reference length, the '014 patent includes an express definition of the reference length," and "[t]he '689 and '706 patents do not include an express definition of the reference length, but the intrinsic record allows a POSITA to know the reference length with reasonable certainty." Dkt. No. 92 at 26; *see id.* at 27–29.

Plaintiff replies that Defendants are attempting to import limitations for "peak count" in the '689 Patent. Dkt. No. 95 at 8.

At the May 14, 2025 hearing, the parties presented oral arguments.

(2) Analysis

Claim 1 of the '689 Patent recites, in relevant part (emphasis added):

> 1. An electrolytic copper foil, which includes a first surface and a second surface opposite the first surface, the electrolytic copper foil comprising:
>
> a copper layer including a matte surface facing the first surface and a shiny surface facing the second surface;
>
> a first protective layer on the matte surface of the copper layer; and
>
> a second protective layer on the shiny surface of the copper layer,

> wherein:
> . . .
> a peak count (Pc) of each of the first and second surfaces of the electrolytic copper foil ranges from 3 to 92, ...

As to Defendants' indefiniteness argument based on measurement variability, the *SmithKline* case cited by Plaintiff is persuasive that Defendants' argument pertains to infringement analysis, not indefiniteness. *See SmithKline*, 403 F.3d at 1340–41 ("The test for indefiniteness does not depend on a potential infringer's ability to ascertain the nature of its own accused product to determine infringement, but instead on whether the claim delineates to a skilled artisan the bounds of the invention. In this case, the problem for Apotex is that it cannot accurately ascertain the nature of its own product. The scope of this claim is clear; the infringement of the Apotex product is not.").

As to Defendants' proposed construction for "peak count (PC)," the specification discloses:

> In the *present invention, the "peak count (Pc)" may* be obtained by measuring peak counts (Pc) of any three points on the surface of the electrolytic copper foil 110 and calculating an average value of measured values of the peak counts (Pc). The peak count (Pc) of each of the points *is* the number of effective peaks P1, P2, P3, and P4 which rise above a 0.5 μm upper criteria line C1 per 4 mm unit sample length in a surface roughness profile obtained according to U.S. standard ASME B46.1-2009. In this case, at least one valley deeper than a −0.5 μm lower criteria line C2 exists between adjacent effective peaks among the effective peaks. When there is no valley deeper than the −0.5 μm lower criteria line C2 between adjacent peaks which rise above the upper criteria line C1, all of the adjacent peaks may not be "effective peaks" used for measuring the peak count (Pc), and relatively lower peaks among the peaks are ignored when obtaining the number of "effective peaks."

'689 Patent at 7:43–59 (emphasis added).

Although this above-reproduced disclosure uses a permissive word, "may," this sentence refers to "the present invention," and the subsequent sentence refers to what the peak count "is."

Also, the patentee's use of quotation marks around the term here at issue, "peak count (Pc)," weighs further in favor of finding that this disclosure sets forth a definition. *Sinorgchem*

Co., Shandong v. Int'l Trade Comm'n, 511 F.3d 1132, 1136 (Fed. Cir. 2007) ("The term . . . is set off by quotation marks—often a strong indication that what follows is a definition.") (citation omitted).

On balance, the above-reproduced disclosure is lexicography and therefore governs the construction of "peak count (Pc)." *See Phillips*, 415 F.3d at 1316.

Plaintiff's recent statements in IPR proceedings reinforce this conclusion. There, Plaintiff stated, in a section titled "III. Claim Construction" in its January 24, 2025 Patent Owner Preliminary Response, that "the '689 patent explains peak count (Pc) with reference to Figure 2." Dkt. No. 92, Ex. 27 at 4. Plaintiff then reproduced the same disclosure that is reproduced above. *Id.* at 5 (reproducing '689 Patent at 7:43–59). Plaintiff then stated: "Accordingly, the claims of the '689 patent apply this description when evaluating the meaning of 'peak count (Pc).' And Petitioner applies this description throughout the Petition." *Id.* (citation omitted). Then, in distinguishing cited references, Plaintiff stated:

> The Petition begins with the premise that Pc (peak count) is a well-recognized measurement parameter that reflects the number of peak counts or effective peaks based on "(i) an 'upper criteria line' and (ii) a 'lower criteria line' per (iii) 'unit sampling length'." But regardless of whether Pc is a recognized *measurement*, Petitioner *ignores* the requirements that the measurement includes (1) an upper criteria line, (2) a lower criteria line, and (3) any unit sampling length. *See* Section III. The Pc limitations require a specific upper criteria line (i.e., 0.5 μm), specific lower criteria line (i.e., -0.5 μm), and specific sampling length (i.e., 4mm), as explained by the '689 patent. None of Petitioner's art addresses any of these features.

Id. at 35 (citation omitted). These statements reinforce that the specification defines the term "peak count (Pc)." *See Phillips*, 415 F.3d at 1316 ("the inventor's lexicography governs") (citation omitted); *cf. Aylus Networks, Inc. v. Apple Inc.*, 856 F.3d 1353, 1360 (Fed. Cir. 2017) ("Because an IPR proceeding involves reexamination of an earlier administrative grant of a patent, it follows

that statements made by a patent owner during an IPR proceeding can be considered during claim construction and relied upon to support a finding of prosecution disclaimer.").

The Court therefore hereby construes these disputed terms as set forth in the following chart:

Term	Construction
"peak count (Pc)"	**"the average of three values of the number of effective peaks which rise above a 0.5 µm upper criteria line per 4 mm unit sample length in a surface roughness profile obtained according to U.S. standard ASME B46.1-2009, where at least one valley deeper than a -0.5 µm lower criteria line C2 exists between adjacent effective peaks among the effective peaks"**
"a peak count (Pc) of each of the first and second surfaces of the electrolytic copper foil ranges from 3 to 92"	**Plain meaning (apart from the Court's construction of "peak count (Pc)," above)**

F. Peak Density Terms (Terms No. 16, 24, 27, 29)

"a binding coefficient of the electrolytic copper foil at the first surface or the second surface, defined as Mathematical Expression 1 below, is 1.5 to 9.4, (Mathematical Expression 1) Binding coefficient = Rp/µm + peak density/30 + amount of attachment of Cr/(mg/m^2) (wherein the Rp (µm) is a peak height measured according to JIS B 0601 (2001) standard, wherein the peak density is a number of peaks per unit length of 4 mm, wherein the peak density is measured according to ASME B46.1 (2009) standard with a peak count level of ±0.5 µm and wherein the amount of attachment of Cr (mg/m^2) is measured by dissolving the first surface or the second surface of the electrolytic copper foil (110) with a nitric acid solution to obtain a dissolved solution, diluting the dissolved solution with water to obtain a diluted solution, and analyzing the diluted solution using an atomic absorption spectrometer)" ('014 Patent, Claim 1)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Not indefinite	Indefinite

"peak density (PD)" ('706 Patent, Claim 1)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Not indefinite; plain and ordinary meaning	"the number of SAE peaks (a profile irregularity wherein the profile intersects consecutively a lower and an upper boundary line) in a given measurement length, as measured according to ASME B46.1 standards with a peak count level of ±0.5 μm from the center line of the profile and a measurement length of 4 mm" Alternatively: Indefinite
"a difference (|ΔPD|) between a peak density (PD) at the first surface of the electrolytic copper foil and a peak density (PD) at the second surface of the electrolytic copper foil is 96 ea or less" ('706 Patent, Claim 1)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Not indefinite	Indefinite
"peak density" ('014 Patent, Claim 1)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
plain and ordinary meaning	"the number of peaks (a profile irregularity wherein the profile intersects consecutively a lower and an upper boundary line) per unit length of 4 mm, measured according to ASME B46.1 (2009) with a peak count level of +/- 0.5 μm"

"peak density/30 . . . wherein the peak density is a number of peaks per unit length of 4 mm, wherein the peak density is measured according to ASME B46.1 (2009) standard with a peak count level of +/- 0.5 µm" ('014 Patent, Claim 1)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Not indefinite	Indefinite

Dkt. No. 89 at 26; Dkt. No. 92 at 21, 27 & 29; Dkt. No. 97, Ex. A at 24, 25, 27 & 29–30.

Shortly before the start of the May 14, 2025 hearing, the Court provided the parties with the following preliminary constructions:

Term		Preliminary Constructions
"a binding coefficient of the electrolytic copper foil at the first surface or the second surface, defined as Mathematical Expression 1 below, is 1.5 to 9.4, (Mathematical Expression 1) Binding coefficient = Rp/µm + peak density/30 + amount of attachment of Cr/(mg/m^2) (wherein the Rp (µm) is a peak height measured according to JIS B 0601 (2001) standard, wherein the peak density is a number of peaks per unit length of 4 mm, wherein the peak density is measured according to ASME B46.1 (2009) standard with a peak count level of ±0.5 µm and wherein the amount of attachment of Cr (mg/m^2) is measured by dissolving the first surface or the second surface of the electrolytic copper foil (110) with a nitric acid solution to obtain a dissolved solution, diluting the dissolved solution with water to obtain a diluted solution, and analyzing the diluted solution using an atomic absorption spectrometer)" ('014 Patent, Claim 1)		Plain meaning
"peak density (PD)" ('706 Patent, Claim 1)	"the number of SAE (Society of Automotive Engineers) peaks in a given measurement length, as measured according to ASME B46.1 standards with a peak count level of ±0.5 µm from the center line of the profile and a measurement length of 4 mm"	

"a difference (|ΔPD|) between a peak density (PD) at the first surface of the electrolytic copper foil and a peak density (PD) at the second surface of the electrolytic copper foil is 96 ea or less" ('706 Patent, Claim 1)	Plain meaning
"peak density" ('014 Patent, Claim 1)	Plain meaning
"peak density/30 . . . wherein the peak density is a number of peaks per unit length of 4 mm, wherein the peak density is measured according to ASME B46.1 (2009) standard with a peak count level of +/- 0.5 μm" ('014 Patent, Claim 1)	Plain meaning

(1) The Parties' Positions

As to the "a binding coefficient . . ." term, Plaintiff argues that "the claim language is unequivocal that, so long as the binding coefficient is within the claimed range, the product infringes[,]" and "[t]he fact that sampling peak density and/or the amount of attachment Cr at certain locations may yield a binding coefficient that falls outside the scope of the claims is immaterial and does not render the claims indefinite." Dkt. No. 89 at 22 (citations omitted).

As to the other "peak density" terms, Plaintiff argues that "peak density" is a well-known term of art and that "[a] POSITA at the time of the inventions would have known that the plain and ordinary meaning of 'peak density' is 'the number of peaks per unit length of a roughness profile that subsequently intersects a lower boundary line and an upper boundary line.'" *Id.* at 26–27 (citations omitted). Plaintiff also argues that "the fact that sampling at certain locations may yield a result that falls outside the scope of the claims is immaterial and does not render the claims indefinite—so long as the [*sic*] either of the peak density terms is within the claimed range, the product infringes." *Id.* at 28 (citation omitted).

Defendants respond that "[t]he Peak Density Terms are indefinite because a POSITA may select any point on the surface of a material by which to measure its peak density, resulting in materially different values often varying over *several hundred percent* in the same piece of foil." Dkt. No. 92 at 21 (citation omitted). Defendants submit that "[t]he parties' testing shows numerous cases where the same copper foil simultaneously has peak density values inside and outside of the claimed ranges based on the random sampling location." *Id.* at 23 (citations omitted). Defendants conclude that these claims are "arbitrary and ambiguous" and that "a POSITA cannot reasonably determine if a foil is within or outside the scope of the claims." *Id.* at 24.

Plaintiff replies that Defendants' arguments fail because they are directed to experimental conditions that all relate to the same method of measurement. Dkt. No. 95 at 7. Plaintiff also argues that any disputes regarding test methodology are disputes regarding infringement, not indefiniteness. *Id.* Plaintiff also argues that the '014 Patent sets forth no relevant lexicography and that Defendants are attempting to import limitations for "peak density (PD)" in the '706 patent. Dkt. No. 95 at 8.

At the May 14, 2025 hearing, the parties presented oral arguments.

(2) Analysis

Claim 1 of the '014 Patent expressly defines the binding coefficient equation and expressly defines peak count density as "a number of peaks per unit length of 4 mm, wherein the peak density is measured according to ASME B46.1 (2009) standard with a peak count level of ±0.5 μm." No further construction is necessary as to those terms. Defendants argue, for example, that their proposed construction properly sets forth the reference length, but the express claim language already recites that "the peak density is a number of peaks *per unit length of 4 mm*."

As for the "peak density (PD)" in Claim 1 of the '706 Patent, the specification discloses:

> The peak density PD was measured according to ASME Bb 46.1 standards, and the peak density was measured using a roughness tester from Mahr Company (Model name: MarsurfM300) and a stylus tip having a radius of 2 μm. The 40 peak count level was ±0.5 μm from the center line of the profile, the measurement length, excluding the cut-off length, was 4 mm, and the cut-off length was 0.8 mm at the first stage and the last stage. The measurement pressure was 0.7 mN. The average of the values obtained by performing the measurement three times was taken as the peak density.

'706 Patent at 8:36–45. In recent IPR proceedings, Plaintiff stated:

> Finally, as defined in the '706 patent, peak density (PD) is the number of SAE (Society of Automotive Engineers) peaks in a given measurement length, as measured according to ASME B46.1 standards with a peak count level of ±0.5 μm from the center line of the profile and a measurement length of 4 mm. An SAE peak is defined as "a profile irregularity wherein the profile intersects consecutively a lower and an upper boundary line."

Dkt. No. 92, Ex. 29, Jan. 29, 2025 Patent Owner Preliminary Response at 6–7 (citing '706 Patent at 8:36–43). This definitive, definitional statement should be given effect through claim construction. *See Phillips*, 415 F.3d at 1316 ("the inventor's lexicography governs") (citation omitted); *cf. Aylus*, 856 F.3d at 1360 ("Because an IPR proceeding involves reexamination of an earlier administrative grant of a patent, it follows that statements made by a patent owner during an IPR proceeding can be considered during claim construction and relied upon to support a finding of prosecution disclaimer.").

As to Defendants' proposed parenthetical—"(a profile irregularity wherein the profile intersects consecutively a lower and an upper boundary line)"—Defendants have not persuasively demonstrated that their proposal is necessary as part of the construction for "peak density (PD)."

As to indefiniteness, Defendants argue that "[t]he Peak Density Terms are indefinite because a POSITA may select any point on the surface of a material by which to measure its peak density, resulting in materially different values often varying over several hundred percent in the same piece of foil." Dkt. No. 92 at 21 (citations omitted); *see, e.g.*, Dkt. No. 89, Ex. 7, Mar. 7,

2025 Arnold Decl. ¶ 43 ("a particular foil may simultaneously meet and not meet the Rpc requirement of the claim depending on the particular three points selected"); *id.* at ¶ 45 (". . . [T]he area tested represents a small portion of the surface of copper foil. With an evaluation length of either 4 mm or 1 cm and a stylus tip radius of 2 microns, the measurement area would be approximately 0.016 mm^2 or 0.02 mm^2. By contrast, SKN manufactures copper foils that are 1400 mm wide and lengths up to 77 km, resulting in a total area of about 107,800,000 mm^2 . . . ."); *id.* at ¶¶ 85–90 ("In my opinion, the Binding Coefficient is indefinite in view of the indefiniteness of the peak density term (discussed above), as well as the measurement variability associated with the Rp and Amount of Attachment of Cr terms discussed further below."); *id.*, Ex. 15 (summary of test results).

Defendants argue, for example:

> For example, the Peak Density Term of the '689 patent requires a range of 3 to 92. Ex. 3 at claim 1. In SKN's testing, its first 8 measurements on samples from the same roll of Volta foil were lower than 3 (0, 0, 0, 0, 0, 0, 2.5, 0) but, undeterred by its prior results, SKN performed a 9th test and obtained a value of 5. Ex. 13 at Appx. C, Rows 124-33 (reproducing data from Ex. 17). Although 8 of 9 measurements were below 3, SKN contends that the foil has a peak density of 3 based on the average of its final three measurements of 0, 2.5 and 5—a result that is plainly not a "random" sampling of the measured data points, but a results-oriented one. Ex. 53 at C2, p. 14. This demonstrates the arbitrary and ambiguous nature of the claims, making them indefinite; a POSITA cannot reasonably determine if a foil is within or outside the scope of the claims.

Dkt. No. 92 at 23–24.

The *SmithKline* case cited by Plaintiff is persuasive that Defendants' argument pertains to infringement analysis, not indefiniteness. *See SmithKline*, 403 F.3d at 1340–41 ("The test for indefiniteness does not depend on a potential infringer's ability to ascertain the nature of its own accused product to determine infringement, but instead on whether the claim delineates to a skilled artisan the bounds of the invention. In this case, the problem for Apotex is that it cannot accurately

ascertain the nature of its own product. The scope of this claim is clear; the infringement of the Apotex product is not.").

Defendants' argument regarding measurement direction (measuring along the machine direction ("MD") or along the transverse direction ("TD")) is unpersuasive for essentially the same reason. Defendants submit that peak count roughness (Rpc) varied by 51%, 60%, and 186% between MD and TD in three comparisons of test results. Dkt. No. 92, Ex. 15 at 11. Nonetheless, the claims here at issue are explicit as to copper foil properties involving peaks, and although measurement results for a particular foil could depend upon manufacturing implementation as well as the manner of usage of measurement techniques that are within the ken of a person of skill in this art, the physical properties recited by the claims are reasonably clear. *Cf. Erfindergemeinschaft UroPep GbR v. Eli Lilly & Co.*, 240 F. Supp. 3d 605, 627, 632 (E.D. Tex. 2017) (Bryson, J., sitting by designation) ("Lily argues that, because of differing experimental conditions, the calculated IC50 value for a particular compound can vary," but noting "standard practice . . . to calculate selectivity ratios based on . . . experiments," and ". . . persons of skill in the art relied on selectivity ratios calculated from the results of experiments . . ."). Any dispute regarding whether a particular accused instrumentality is within the scope pertains to factual issues regarding infringement, not any legal question of indefiniteness. *See SmithKline*, 403 F.3d at 1340–41.

The Court therefore hereby construes these disputed terms as set forth in the following chart:

Term	Construction
"a binding coefficient of the electrolytic copper foil at the first surface or the second surface, defined as Mathematical Expression 1 below, is 1.5 to 9.4, (Mathematical Expression 1) Binding coefficient = Rp/μm + peak density/30 + amount of attachment of Cr/(mg/m^2) (wherein the Rp (μm) is a peak height measured according to JIS B 0601 (2001) standard, wherein the peak density is a number of peaks per unit length of 4 mm, wherein the peak density is measured according to ASME B46.1 (2009) standard with a peak count level of ±0.5 μm and wherein the amount of attachment of Cr (mg/m^2) is measured by dissolving the first surface or the second surface of the electrolytic copper foil (110) with a nitric acid solution to obtain a dissolved solution, diluting the dissolved solution with water to obtain a diluted solution, and analyzing the diluted solution using an atomic absorption spectrometer)" ('014 Patent, Claim 1)	**Plain meaning**
"peak density (PD)" ('706 Patent, Claim 1)	**"the number of SAE (Society of Automotive Engineers) peaks in a given measurement length, as measured according to ASME B46.1 standards with a peak count level of ±0.5 μm from the center line of the profile and a measurement length of 4 mm"**
"a difference (|ΔPD|) between a peak density (PD) at the first surface of the electrolytic copper foil and a peak density (PD) at the second surface of the electrolytic copper foil is 96 ea or less" ('706 Patent, Claim 1)	**Plain meaning**
"peak density" ('014 Patent, Claim 1)	**Plain meaning**
"peak density/30 . . . wherein the peak density is a number of peaks per unit length of 4 mm, wherein the peak density is measured according to ASME B46.1 (2009) standard with a peak count level of +/- 0.5 μm" ('014 Patent, Claim 1)	**Plain meaning**

G. "matte surface," "M surface," "shiny surface," "S surface" (Terms No. 12, 13, 18, 19)

"matte surface" ('689 Patent, Claim 1) **"M surface"** ('706 Patent, Claim 1)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Plain and ordinary meaning	"the surface of the copper foil formed opposite to the surface that is in contact with the electrode drum"
"shiny surface" ('689 Patent, Claim 1) **"S surface"** ('706 Patent, Claim 1)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Plain and ordinary meaning	"the surface of the copper foil formed in contact with the electrode drum"

Dkt. No. 89 at 28; Dkt. No. 92 at 31; Dkt. No. 97, Ex. A at 12, 13, 20 & 21.

Shortly before the start of the May 14, 2025 hearing, the Court provided the parties with the following preliminary constructions for these groups of terms, respectively: "the surface of the copper foil formed opposite to the surface that is in contact with an electrode drum when the copper foil is formed"; and "the surface of the copper foil formed in contact with an electrode drum."

(1) The Parties' Positions

The parties agree that "matte surface" and "M surface" are synonymous and that "shiny surface" and "S surface" are synonymous. Dkt. No. 89 at 28.

Plaintiff argues that "matte surface" and "shiny surface" "are terms that a person of ordinary skill in the art (and likely a layperson) would readily understand," and "the plain and

ordinary meaning for each disputed term is readily apparent: a 'matte surface' is that with a dull or flat finish, while a 'shiny surface' is just what it says—a shiny surface." *Id.* at 28.

Defendants respond that "Volta's constructions will assist the jury in understanding the meaning of the 'matte' ('M') and 'shiny' ('S') surfaces, and they mirror the specifications' express disclosures." Dkt. No. 92 at 31. Defendants argue that "SKN's proposal to afford these terms their plain and ordinary meaning ignores that the members of the lay jury are unlikely to be familiar with use of these terms in the technical context of the '689 and '706 patents." *Id.* at 32 (citation omitted). Defendants also urge that "SKN's proposal would not be helpful to the jury because it would require a subjective visual inspection to assess which side is matte or shiny, when both sides may appear shiny to the untrained eye," and "the '689 patent's specification is clear that the 'shiny surface' may not always have a lower roughness (and thus be more shiny) than the 'matte surface.'" *Id.* (citations omitted).

Plaintiff replies that "Defendants fail to rebut that their constructions ignore the meanings of 'matte' and 'shiny' entirely and improperly import extraneous limitations from the specification." Dkt. No. 95 at 9.

At the May 14, 2025 hearing, the parties presented no oral arguments on these terms and instead rested on their briefing.

(2) Analysis

Claim 1 of the '689 Patent, for example, recites (emphasis added):

> 1. An electrolytic copper foil, which includes a first surface and a second surface opposite the first surface, the electrolytic copper foil comprising:
>
> a copper layer including a *matte surface* facing the first surface and a *shiny surface* facing the second surface;
>
> a first protective layer on the *matte surface* of the copper layer; and
>
> a second protective layer on the *shiny surface* of the copper layer,
>
> wherein:

> a coefficient of thermal expansion of the electrolytic copper foil, which is measured using a thermomechanical analyzer (TMA) while heating the electrolytic copper foil from 30° C. to 190° C. at a speed of 5° C./min, ranges from 16 to 22 μm/(m·° C.),
>
> a tensile strength of the electrolytic copper foil, which is measured after a heat treatment at a temperature of 190° C. for 1 hour, ranges from 21 to 36 kgf/mm^2,
>
> a weight deviation of the electrolytic copper foil is 5% or less,
>
> a peak count (Pc) of each of the first and second surfaces of the electrolytic copper foil ranges from 3 to 92, and
>
> each of the first and second surfaces has a surface roughness (R_z) of 3.5 μm or less.

The specification of the '689 Patent discloses:

> The copper layer 111 of the present invention may be formed on a rotating negative electrode drum by electroplating being performed. The shiny surface SS thereof *refers to a surface that comes into contact with the rotating negative electrode drum* in an electroplating process, and the matte surface MS refers to a surface *opposite* the shiny surface 49. Generally, the shiny surface SS has a lower surface roughness (Rz) than the matte surface MS, but the present invention is not limited thereto, and *the surface roughness (Rz) of the shiny surface SS may be higher than or equal to that of the matte surface MS.*

'689 Patent at 5:14–20 (emphasis added).

The specification of the '706 Patent similarly discloses:

> The electrolytic copper foil 100 is formed on a rotary negative electrode drum by electroplating. The electrolytic copper foil 100 has a shiny surface (an S surface), which *is the surface that is in direct contact with the rotary negative electrode drum during electroplating*, and a matte surface (an M surface), which *is opposite the shiny surface*. For example, in the present disclosure, the first surface may be the S surface, and the second surface may be the M surface.

'706 Patent at 3:32–39 (emphasis added); *see id.* at 6:24–25 ("the S surface of the electrolytic copper foil contacts the drum"); *see also id.* at 6:21–7:15 (similar).

Although these disclosures refer to particular embodiments and although "matte" and "shiny" have meanings in common parlance, the above-reproduced disclosures confirm that the patentee used these terms in a "highly technical" and "idiosyncratic" manner specific to this context of copper foil manufacturing. *Intervet, Inc. v. Merial Ltd.*, 617 F.3d 1282, 1287 (Fed. Cir.

2010) ("Idiosyncratic language, highly technical terms, or terms coined by the inventor are best understood by reference to the specification.") (citing *Phillips*, 415 F.3d at 1315). Even if, as Plaintiff submits, an expert "may" be able to visually distinguish between a "matte" side and a "shiny" side in some instances (Dkt. No. 89, Ex. 7, Arnold Decl. ¶ 282; *see* Dkt. No. 92, Ex. 32, Apr. 1, 2025 Arnold dep. at 205:1–206:18 ("if the contrast is large enough, yes")), the applicable technical meanings should be given effect through claim construction.

Finally, the *International Test Solutions* case cited by Plaintiff, which involved an indefiniteness challenge and, also, involved different patents and different technology, is unpersuasive. *Int'l Test Sols., Inc. v. Mipox Int'l Corp.*, No. 16-CV-00791-RS, 2017 WL 1367975, at *10 (N.D. Cal. Apr. 10, 2017) (Seeborg, J.) ("'matte finish' will be construed according to its plain meaning" as distinguishable from "mirror finish"); *see e.Digital Corp. v. Futurewei Techs., Inc.*, 772 F.3d 723, 727 (Fed. Cir. 2014) ("claims of unrelated patents must be construed separately").

The Court therefore hereby construes these disputed terms as set forth in the following chart:

Term	Construction
"matte surface" "M surface"	**"the surface of the copper foil formed opposite to the surface that is in contact with an electrode drum when the copper foil is formed"**
"shiny surface" "S surface"	**"the surface of the copper foil formed in contact with an electrode drum"**

H. "so as to prevent the generation of wrinkles at a surface of the copper foil" (Term No. 4)

"so as to prevent the generation of wrinkles at a surface of the copper foil" ('541 Patent, Claim 1)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Plain and ordinary meaning	"the copper foil has no wrinkles when tested in accordance with the method shown in Figure 1"

Dkt. No. 89 at 29; Dkt. No. 92 at 32; Dkt. No. 97, Ex. A at 6.

Shortly before the start of the May 14, 2025 hearing, the Court provided the parties with the following preliminary construction: "such that a surface of the copper foil has no wrinkles."

(1) The Parties' Positions

Plaintiff argues that "[t]he plain language of claim 1 recites a number of limitations for preventing the generation of wrinkles at the surface of the copper foil," and "[c]ontrary to Defendants' proposed construction, it does not recite a copper foil with 'no wrinkles.'" Dkt. No. 89 at 30.

Defendants respond that "[t]he 'so as to prevent the generation of wrinkles' limitation of claim 1 of the '541 patent should be construed such that the copper foil has no wrinkles when tested in accordance with Figure 1—the only boundary provided by the patent to ascertain whether a product is within or outside the scope of the claim." Dkt. No. 92 at 32; *see id.* at 32–34. Defendants also argue that, during prosecution, the patentee amended the claim so as to include a limitation of "so as to prevent the generation of wrinkles at a surface of the copper foil" and distinguished cited references that had wrinkles, arguing that, in the claimed invention, "*no wrinkles* are created." *Id.* at 34–35 (emphasis added) (quoting Feb. 18, 2016 Amendment Under 37 C.F.R. § 1.111 at 18 (SKN-0002348)). Further, Defendants argue that Plaintiff's interpretation

allows for wrinkles and would make the claim indefinite because "the patent fails to provide objective boundaries as to [the] extent wrinkles must be decreased." *Id.* at 35.

Plaintiff replies that "claim 1 recites a copper foil with specific requirements for preventing the generation of wrinkles, not 'creat[ing] a copper foil with no wrinkles' as Defendants allege." Dkt. No. 95 at 9. Plaintiff also argues that "[t]he amended claim language does not recite 'copper foils with no wrinkles,' and Defendants' misleading and scattershot read of the prosecution history does not come close to supporting such a disclaimer." *Id.* at 10 (citation omitted).

At the May 14, 2025 hearing, the parties presented oral arguments. Defendants proposed, as an alternative proposed construction in light of the Court's preliminary construction: "such that a surface of the copper foil has no wrinkles, unlike the film shown in Figure 1, which does have wrinkles."

(2) Analysis

Claim 1 of the '541 Patent, for example, recites (emphasis added):

> 1. A copper foil for a current collector of a lithium secondary battery,
> wherein, in a crystalline structure, a ratio of a sum of texture coefficients of a (111) surface and a (200) surface to a total sum of texture coefficients of the (111) surface, the (200) surface and a (220) surface is 60 to 85%, a ratio of a texture coefficient of the (111) surface to the total sum of texture coefficients of the (111) surface, the (200) surface and the (220) surface is 18 to 38%, a ratio of the texture coefficient of the (200) surface to the total sum of texture coefficients of the (111) surface, the (200) surface and the (220) surface is 28 to 62%, and a ratio of the texture coefficient of the (220) surface to the total sum of texture coefficients of the (111) surface, the (200) surface and the (220) surface is 15 to 40%,
> wherein the texture coefficient satisfies the following equation:
>
> $$TC(hkl) \geq \frac{\frac{I(hkl)}{I_0(hkl)}}{\frac{1}{n}\sum\frac{I(hkl)}{I_0(hkl)}}$$
>
> wherein I(hkl) represents a measured diffraction intensity with respect to a (hkl) surface, and I_0(hkl) represents a standard diffraction intensity of ASTM (American Society of Testing Materials) standard powder-shaped diffraction data,
> wherein the copper foil has a weight deviation of 3% or less, and
> wherein the copper foil has a tensile strength of 30 to 40 kgf/mm^2,

so as to prevent the generation of wrinkles at a surface of the copper foil.

The Background of the Invention section of the specification states that wrinkles can cause problems:

> In case a wrinkle exists on a surface of a copper foil as shown in FIG. 1, active material is not uniformly coated due to the irregularity of the surface shape, which may cause a short-circuit or separate the active material from the copper foil during a charging or discharging process.

'541 Patent at 1:58–62.

The Summary of the Invention, in turn, refers to "decreasing" or "substantially not caus[ing]" wrinkles:

> The present invention is designed to solve the problems of the prior art, and therefore it is an object of the present invention to provide a copper foil for a current collector of a lithium secondary battery with a crystal structure capable of *decreasing the generation of wrinkles* at a surface of the copper foil.
>
> Another object of the present invention is to provide a copper foil for a current collector of a lithium secondary battery, wherein factors such as surface roughness, weight deviation, tensile strength, elongation, and thickness are optimized so as to effectively *decrease the generation of wrinkles* at a surface of the copper foil.
>
> * * *
>
> The copper foil for a current collector of a lithium secondary battery according to the present invention *does substantially not cause the generation of a wrinkle* at a surface of the copper foil, so it is possible to form a uniform coating surface and prevent a short circuit when being coated with active material.

Id. at 1:66–2:10 & 2:31–36 (emphasis added).

All seven of the examples set forth in Table 1 of the '541 Patent list the "Number of wrinkles" as being "0," and the specification explains:

> Seeing the table 1, it would be understood that the copper foils according to the examples 1 to 7 of the present invention satisfy all conditions of the texture coefficient ratio, the tensile strength, the weight deviation and the copper foil thickness, *so no wrinkle occurs*. Meanwhile, it would be also found that the copper foils according to the comparative examples 1 to 9 have inappropriate

> characteristics as a current collector of a lithium secondary battery since a lot of winkles occur.

Id. at 5:16–24 (emphasis added); *see id.* at 3:3–7 & 3:51–4:45.

Although these are disclosed as examples, and although the above-reproduced disclosures refer to "decreasing" wrinkles, during prosecution the patentee added the disputed term to the claim after an examiner interview in which, as part of discussing a proposal to add "decrease wrinkle generation," the examiner "suggested the use of language such as 'prevent' wrinkle generation' to more clearly delineate what was meant by the wording, and more accurately reflect data presented in Table 1 of the Specification in order to advance full prosecution." Dkt. No. 92, Ex. 24, Applicant-Initiated Interview Summary (SKN-0002329); *see id.*, Oct. 18, 2015 Amendment Under 37 C.F.R. § 1.111 at 6 (SKN-0002302) (". . . [R]eferring to Table 1 . . ., factors which make the number of wrinkles generated at the surface of a copper foil into 0 (zero) are a texture coefficient ratio, a tensile strength and a weight deviation.").

In subsequent prosecution, the patentee distinguished the "Hirose" reference (cited as "US PGPub 2009/0061326") based on "objective evidence showing that the prior art copper foil contains wrinkles at the surface." *Id.*, Feb. 18, 2016 Amendment Under 37 C.F.R. § 1.111 at 6 (SKN-0002336).

Concurrently, the patentee further asserted: ". . . Examples 1 to 7 [of Table 1] satisfy the numerical ranges of all conditions, *defined in Claim 1 of this application*, and *no wrinkles* are created." *Id.* at 18 (SKN-0002348) (emphasis added).

The examiner allowed the claims and expressly referred to this limitation, stating that "[t]he following is an examiner's statement of reasons for allowance: The prior art of record does not teach or suggest a copper foil having the claimed texture coefficients so as to prevent wrinkle generation." *Id.*, Notice of Allowability at 2 (SKN-0002363).

The patentee's statements regarding (and reliance on) generating no wrinkles should be given effect in the Court's construction. *See Omega Eng'g Inc. v. Raytek Corp.*, 334 F.3d 1314, 1324 (Fed. Cir. 2003) ("prosecution disclaimer promotes the public notice function of the intrinsic evidence and protects the public's reliance on definitive statements made during prosecution"); *see also Southwall Techs., Inc. v. Cardinal IG Co.*, 54 F.3d 1570, 1576 (Fed. Cir. 1995) ("Claims may not be construed one way in order to obtain their allowance and in a different way against accused infringers.").

As for the proper construction, however, Defendants' proposal of "no wrinkles when tested in accordance with the method shown in Figure 1" would tend to confuse rather than clarify the scope of the claim. The *Halliburton* case cited by Defendants noted that a person of skill in the art would take the Figures into consideration. *Halliburton Energy Servs., Inc. v. M-I LLC*, 514 F.3d 1244, 1252 (Fed. Cir. 2008) ("A person of ordinary skill would not have ignored these explicit teachings, but rather would have looked to Figure 3 to try to determine the bounds of the claims."). *Halliburton* does not adequately support Defendants' proposed construction because Figure 1 is merely a photograph of an example of a wrinkle. *See* '541 Patent at 2:44–46 ("FIG. 1 is a photograph showing that a wrinkle is generated at a conventional copper foil for a current collector of a lithium secondary battery . . . .").

Any remaining dispute regarding whether a "wrinkle" is present in an accused instrumentality is a factual dispute regarding infringement rather than a legal question for claim construction. *See PPG Indus. v. Guardian Indus. Corp.*, 156 F.3d 1351, 1355 (Fed. Cir. 1998) ("after the court has defined the claim with whatever specificity and precision is warranted by the language of the claim and the evidence bearing on the proper construction, the task of determining whether the construed claim reads on the accused product is for the finder of fact"); *see also*

Acumed LLC v. Stryker Corp., 483 F.3d 800, 806 (Fed. Cir. 2007) ("[t]he resolution of some line-drawing problems . . . is properly left to the trier of fact") (citing *PPG*, 156 F.3d at 1355); *Eon Corp. IP Holdings LLC v. Silver Spring Networks, Inc.*, 815 F.3d 1314, 1318–19 (Fed. Cir. 2016) (citing *PPG*, 156 F.3d at 1355; citing *Acumed*, 483 F.3d at 806).

The Court therefore hereby construes "so as to prevent the generation of wrinkles at a surface of the copper foil at a surface of the copper foil" to mean **"such that a surface of the copper foil has no wrinkles."**

I. Preambles (Terms No. 1, 6, 11)

"A copper foil for a current collector of a lithium secondary battery" ('541 Patent, Claim 1) **"An electrolytic copper foil, for a secondary battery"** ('090 Patent, Claim 1) **"A current collector for a secondary battery"** ('090 Patent, Claim 5)	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Preamble is limiting, plain and ordinary meaning.	Not limiting.

Dkt. No. 89 at 31–32; Dkt. No. 97, Ex. A at 1, 8 & 11–12.

Shortly before the start of the May 14, 2025 hearing, the Court provided the parties with the following preliminary construction: "The preambles of Claim 1 of the '541 Patent, Claim 1 of the '090 Patent, and Claim 5 of the '090 Patent are not limiting."

(1) The Parties' Positions

Plaintiff argues that "[t]he preambles of claim 1 of the '541 Patent and claims 1 and 5 of the '090 Patents are limiting because they recite a copper foil of a secondary battery, which is a

fundamental characteristic, essential structure, and gives necessary meaning and vitality to the claims." Dkt. No. 89 at 32.

Defendants respond that the preambles are not essential to understand these claims, that the bodies of these claims recite complete inventions, and that "the claims do not mention a battery anywhere other than the preamble, and instead relate to a copper foil generally." Dkt. No. 92 at 30 (citations omitted). Defendants conclude that "the preambles' recitation of a 'secondary battery' is not limiting." *Id.* at 31.

Plaintiff replies that "[t]he disputed preambles are limiting because they recite essential structure—the copper foil of a secondary battery," and "secondary battery is indeed structural and its inclusion provides necessary meaning and vitality." Dkt. No. 95 at 10. Plaintiff further argues:

> Moreover, contrary to Defendants' argument, the patentees *did distinguish* at least the '090 claims over the prior art based on the preamble, noting for example that the claimed Rpc range was "an important factor" for capacity maintenance of a secondary battery and distinguishable over the Otsuka prior art. *See* [Dkt. No. 95], Ex. 56 at 10. Furthermore, Defendants' argument that "the patentees did not distinguish any prior art during prosecution on the basis that it did not relate to secondary batteries" is misleading because the primary references were all directed to copper foil for secondary batteries.

Dkt. No. 95 at 10.

At the May 14, 2025 hearing, the parties presented no oral arguments on these preambles and instead rested on their briefing.

(2) Analysis

> In general, a preamble limits the invention if it recites essential structure or steps, or if it is 'necessary to give life, meaning, and vitality' to the claim. *Pitney Bowes*[*, Inc. v. Hewlett-Packard Co.*], 182 F.3d [1298,] 1305 [(Fed. Cir. 1999)]. Conversely, a preamble is not limiting 'where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention.' *Rowe v. Dror*, 112 F.3d 473, 478, 42 USPQ2d 1550, 1553 (Fed. Cir. 1997).

Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc., 289 F.3d 801, 808 (Fed. Cir. 2002);

"When limitations in the body of the claim rely upon and derive antecedent basis from the preamble, then the preamble may act as a necessary component of the claimed invention." *Eaton Corp. v. Rockwell Int'l Corp.*, 323 F.3d 1332, 1339 (Fed. Cir. 2003).

In some cases, a preamble may also be limiting if it states a "fundamental characteristic of the claimed invention," "serves to focus the reader on the invention that is being claimed," or "states the framework of the invention." *On Demand Mach. Corp. v. Ingram Indus., Inc.*, 442 F.3d 1331, 1343 (Fed. Cir. 2006). Also, a preamble may be limiting if it sets forth a feature "underscored as important by the specification." *Deere & Co. v. Bush Hog, LLC*, 703 F.3d 1349, 1358 (Fed. Cir. 2012) (quoting *Catalina*, 289 F.3d at 808).

Nonetheless, "the purpose or intended use of the invention . . . is of no significance to claim construction . . . ." *See Pitney Bowes*, 182 F.3d at 1305.

Here, the preamble of Claim 1 of the '541 Patent recites a copper foil "for a current collector of a lithium secondary battery," and the preambles of Claims 1 and 5 recite a foil or current collector "for a secondary battery."

The patentee's use of "for" supports applying what has sometimes been characterized as "the presumption against reading a statement of purpose in the preamble as a claim limitation." *Marrin v. Griffin*, 599 F.3d 1290, 1294–95 (Fed. Cir. 2010); *see Allen Eng'g Corp. v. Bartell Indus.*, 299 F.3d 1336, 1346 (Fed. Cir. 2002) ("Generally, the preamble does not limit the claims."); *see also Acceleration Bay, LLC v. Activision Blizzard Inc.*, 908 F.3d 765, 769–71 (Fed. Cir. 2018) (in preamble reciting "[a] computer network for providing an information delivery service for a plurality of participants," finding "information delivery service" to be non-limiting because it "merely describe[s] intended uses for what is otherwise a structurally complete invention").

Plaintiff notes that the recital of "A copper foil" in the preamble of Claim 1 of the '541 Patent provides antecedent basis for "the copper foil" in the body of the claim, and the recital of "An electrolytic copper foil" in the preamble of Claim 1 of the '090 Patent provides antecedent basis for "the electrolytic copper foil" in Claims 4 and 5, which depend from Claim 1.

Nonetheless, "that [a] phrase in the preamble . . . provides a necessary structure for [the] claim . . . does not necessarily convert the entire preamble into a limitation, particularly one that only states the intended use of the invention." *TomTom Inc. v. Adolph*, 790 F.3d 1315, 1323 (Fed. Cir. 2015); *see id.* ("It was therefore error for the district court to use an antecedent basis rationale to justify converting this independent part of the preamble into a new claim limitation.").

Plaintiff also notes that the specifications refer to a "secondary battery" and a "current collector" when discussing the "present invention":

> The present invention relates to a copper foil used as a current collector of a lithium secondary battery, and more particularly to a copper foil for a current collector of a lithium secondary battery, which has a structure capable of preventing the generation of wrinkles on a surface of the copper foil.

'541 Patent at 1:17–22.

> The present invention relates to an electrolytic copper foil, a current collector including the same, an electrode including the same, a secondary battery including the same, and a method for manufacturing the same.

'090 Patent at 1:12–16.

These disclosures, however, pertain to what the "present invention" "relates to" or what a copper foil is "used as" and thus do not persuasively demonstrate that a "secondary battery" or "current collector" are "underscored as important by the specification." *Deere*, 703 F.3d at 1358; *see TomTom*, 790 F.3d at 1323 (preamble "only states the intended use of the invention").

Disclosures regarding "related" art and "applicability" to industry are also therefore unpersuasive. *See* '541 Patent at 1:24–62 ("Description of the Related Art" section discussing

secondary batteries) & 5:44–52 ("Applicability to the Industry" section discussing secondary batteries); '090 Patent at 1:19–52 ("Description of Related Art" section discussing secondary batteries), 3:13–22 ("Advantageous Effects" section discussing secondary batteries) & 4:39–55 (regarding "repealed [*sic*, repeated] charge/discharge of secondary batteries").

Additional disclosures cited by Plaintiff are likewise unpersuasive. *See* '541 Patent at 1:64–2:23 (regarding "object[s]" and "aspect[s]" of "the present invention"), 2:47–50 ("according to the present invention"), 3:3–12 ("according to the present invention"), 4:46–50 ("according to examples 1 to 7 of the present invention"), 5:25–29 ("according to the present invention") & 5:36–40 ("The present invention has been described in detail. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only . . . ."); *see also* '090 Patent at 1:56–2:9 ("the present invention is directed to"; "An aspect of the present invention is . . . ."), 3:9–12 ("General description related to the present invention given above serves to illustrate or disclose the present invention and should not be construed as limiting the scope of the present invention."), 3:16–19 ("According to the present invention . . . .") & 3:61–4:2 ("according to an embodiment of the present invention").

Even disclosure regarding "current collector 110 of the present invention" refers to a particular embodiment, as evident from the usage of a reference numeral used in Figure 1 of the '090 Patent ("110"), particularly when coupled with the disclosure that Figure 1 illustrates "an *embodiment* of the present invention." '090 Patent at 3:32–34 (emphasis added); *see id.* at 4:7–21 ("current collector 110 of the present invention") & 7:8–15 ("the current collector 110 is coated with at least one active material . . . to produce an electrode (that is, anode) for secondary batteries of the present invention").

Further, Plaintiff notes that the Title of the '541 Patent ("Copper Foil for Current Collector of Lithium Secondary Battery with Improved Wrinkle Characteristics") and the Title of the '090 Patent ("Electrolytic Copper Foil, Current Collector Comprising the Same, Electrode Comprising the Same, Secondary Battery Comprising the Same, and Method for Manufacturing the Same") refer to "copper foil," "current collector," and "secondary battery." Although the Titles can be considered, the Federal Circuit has noted "[t]he near irrelevancy of the patent title to claim construction," and in the present case the Titles are not persuasive. *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1312 (Fed. Cir. 1999).

Finally, Plaintiff cites prosecution history of the '090 Patent. Dkt. No. 95 at 10 (citing *id.*, Ex. 56, Apr. 8, 2019 Amendment and Response to Non-Final Office Action at 10). Therein, the patentee cited the following portion of the specification:

> [T]he present applicant found that an electrolytic copper foil 111 the shiny surface 111a and the matte surface 111b of which have a ten-point mean roughness R_{zJIS} of 2 μm or less does not always secure capacity maintenance of the secondary battery, of 90% or higher. That is, a low ten-point mean roughness R_{zJIS} (for example, 2 μm or less) of the shiny surface 111a and the matte surface 111b of the electrolytic copper foil 111 cannot be a sufficient condition for capacity maintenance of the secondary battery of 90% or higher.
>
> In particular, it was found that there is less correlation between the ten-point mean roughness R_{zJIS} of the electrolytic copper foil 111 and capacity maintenance of the secondary battery when the active material layer 120 contains Si for high capacity of the secondary battery.
>
> As a result of repeated research, the present applicant found that a peak count roughness R_{pc} of the electrolytic copper foil 111 is *an important factor* in stably securing capacity maintenance of 90% or higher.

'090 Patent at 5:4–22 (emphasis added).

First, the cited disclosure regarding a secondary battery pertains to a particular embodiment. Second, the patentee did not rely on the preamble but rather presented arguments regarding peak count roughness, urging that "the Examiner has not established a *prima facie* case

of obviousness because none of the cited references explicitly or implicitly teach or suggest an electrolytic copper foil having a peak count roughness (Rpc) of the claimed range." *Id.*, Ex. 56, Apr. 8, 2019 Amendment and Response to Non-Final Office Action at 11.

The Court therefore hereby finds that **the preambles of Claim 1 of the '541 Patent, Claim 1 of the '090 Patent, and Claim 5 of the '090 Patent are not limiting.**

V. CONCLUSION

The Court adopts the constructions set forth in this Order for the disputed terms of the patent-in-suit. The parties are ordered that they may not refer, directly or indirectly, to each other's claim construction positions in the presence of the jury. Likewise, the parties are ordered to refrain from mentioning any portion of this opinion, other than the actual definitions adopted by the Court, in the presence of the jury. Any reference to claim construction proceedings is limited to informing the jury of the definitions adopted by the Court.

SIGNED this 23rd day of May, 2025.

ROY S. PAYNE
UNITED STATES MAGISTRATE JUDGE